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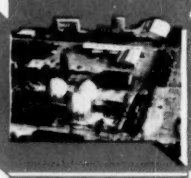
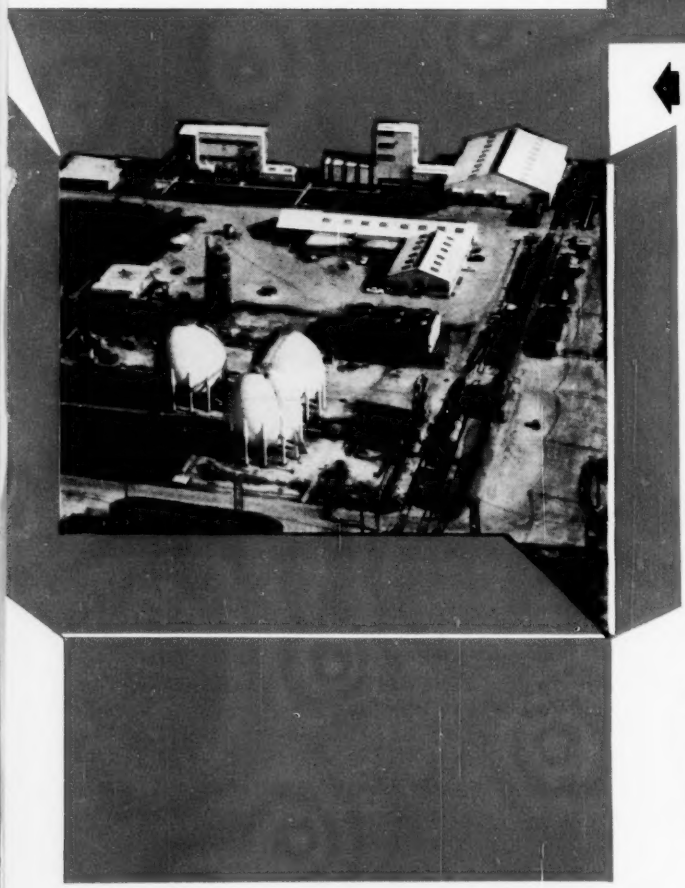
Chemical Week





Packaged plants—first complete listing. CW Report ..... p. 101

Russia's chemical trade is on the upswing. New threat to U. S. industry ..... p. 27

Building a wharf? Here's how companies save money on waterside facilities .. p. 40

Home furnishings: booming market for plastics, synthetic fibers ..... p. 81

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September 20, 1958

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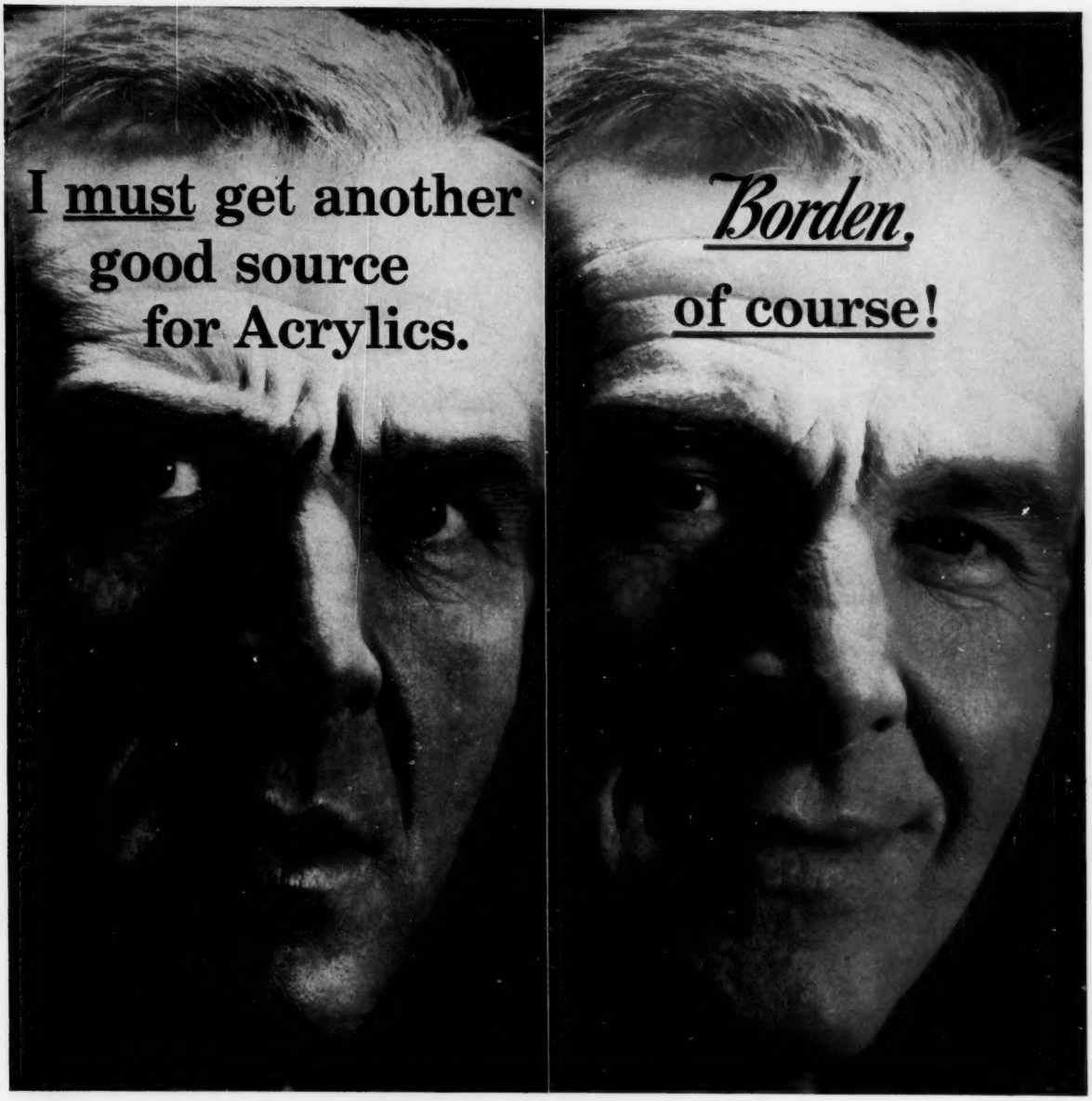

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Chemical Week

TOP OF THE WEEK **SEPTEMBER 20, 1958**

- **Shell scientists volunteer to help teach in Los Angeles** high schools. Aim: to draw more students into science fields **p. 47**
- **General Electric ties sales and inventory control closer** with simplified statistical method ..... **p. 59**
- **Cheaper copper strip from scrap** is produced by process improvements devised by Fluor .....**p. 69**
- **Israel is fertile ground for research, process plants.** It's making a frank bid for U.S. manpower and money .....**p. 93**

16 VIEWPOINT
Merger of AFL-CIO chemical unions is nearer. Does this presage more-harmonious labor-management relations—or broader areas of discord?

16 OPINION

16 MEETINGS

23 BUSINESS NEWSLETTER

27 First look at U.S.S.R.'s chemical trade data. It shows use of Soviet satellites and Western nations to sustain and expand Red industry.

29 New chemical applications are probed to help brighten prospects for lead and zinc producers.

29 At scenic Lake George, N.Y., chemical and pharmaceutical executives take outdoor holiday after mapping DCAT's '59 program.

30 Improving economic conditions are reflected in corridor conversations of ACS delegates at Chicago.

30 Unsettled political situation casts shadows on Mexican titanium dioxide projects.

37 WASHINGTON NEWSLETTER

40 PRODUCTION
Water terminal facilities can be a valuable plant addition. Here's how to get the most for your money.

47 ADMINISTRATION
Shell staffers show how industry feels about science education, lecture to Los Angeles school students.

50 Basic production abroad is likely key to profitable selling in the European "common market," CPI executive counsels.

59 SALES
Probability mathematics gives GE simple way to keep tabs on inventories of chemical products.

60 CMRA schedules conference on market research techniques.

63 SPECIALTIES
Big shift in the auto paint field: General Motors swings to acrylic lacquers; others turn to high-melamine enamels. And epoxy undercoats are becoming standard.

66 Great Britain is market for $95 million worth of cosmetics.

69 ENGINEERING
New processes are teamed to recover copper powder from low-grade scrap, roll it into metal strip.

72 Ethylene oxide producers swap processing know-how at Scientific Design's license meeting.

75 TECHNOLOGY NEWSLETTER

81 MARKETS
Plastics, synthetic textiles are top contenders for lush, multimillion-dollar market in home furnishings.

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93 RESEARCH
Israel's need for chemical research and process plants outlined by chief of Israeli technical university.

101 CW REPORT
Packaged plants offer a lot of advantages for low-cost expansion, modernization. Here's first list of available plants and equipment—how best to use the "package."

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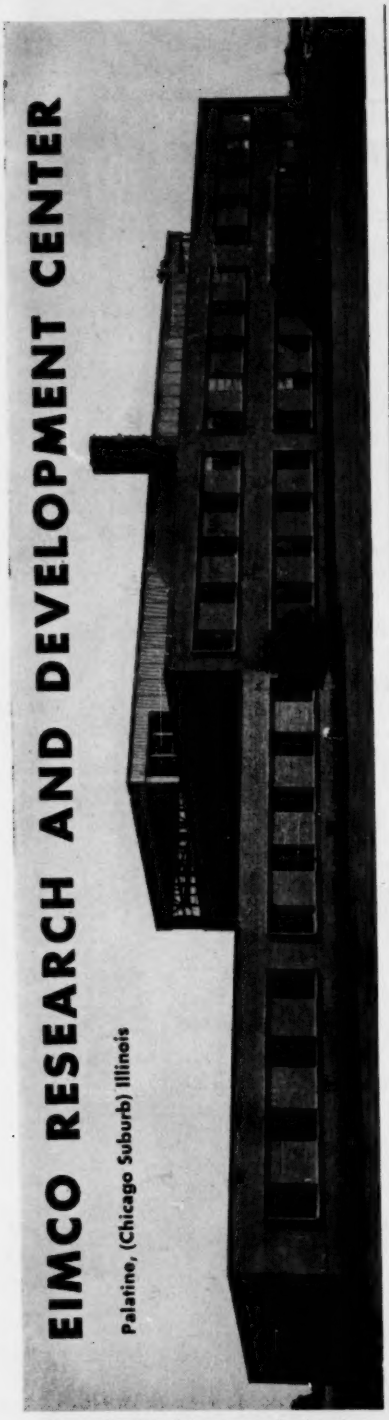

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Construction work continues as fast as possible on Witco's new phthalic plant. Structural steel, tanks, reactors, columns will soon be all in place, and the most modern quality control equipment is being installed. When it's on stream in early 1959, Witco's new plant will provide 20,000,000 lbs. annually of highest quality phthalic.

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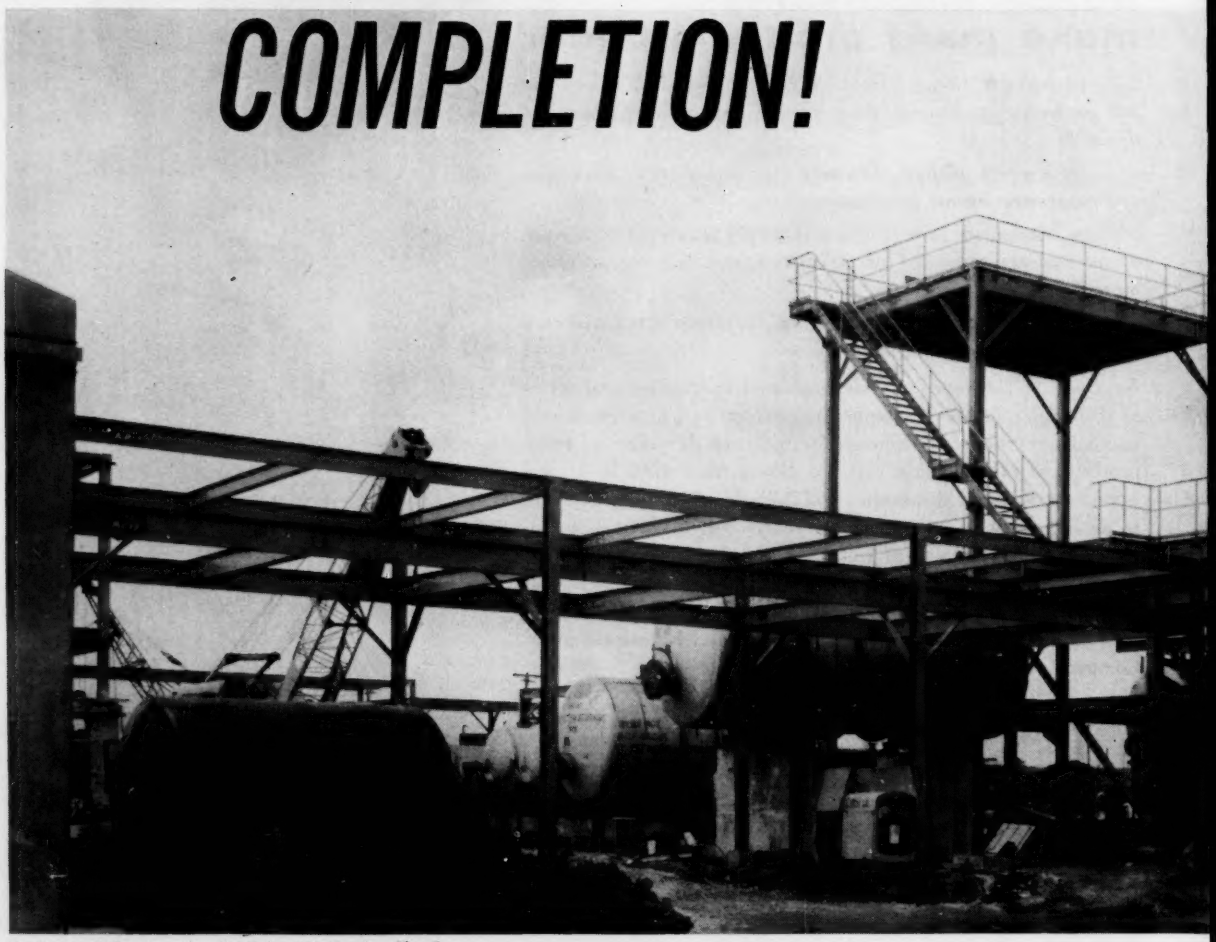
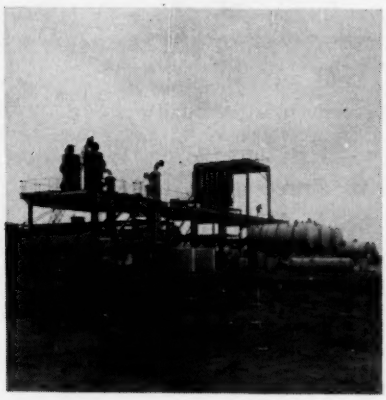
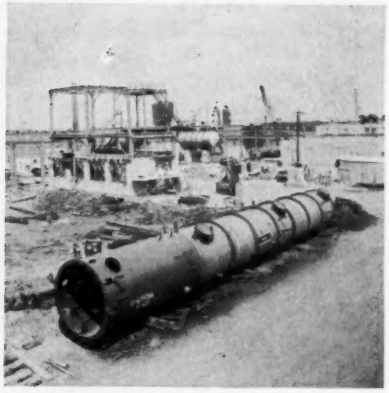
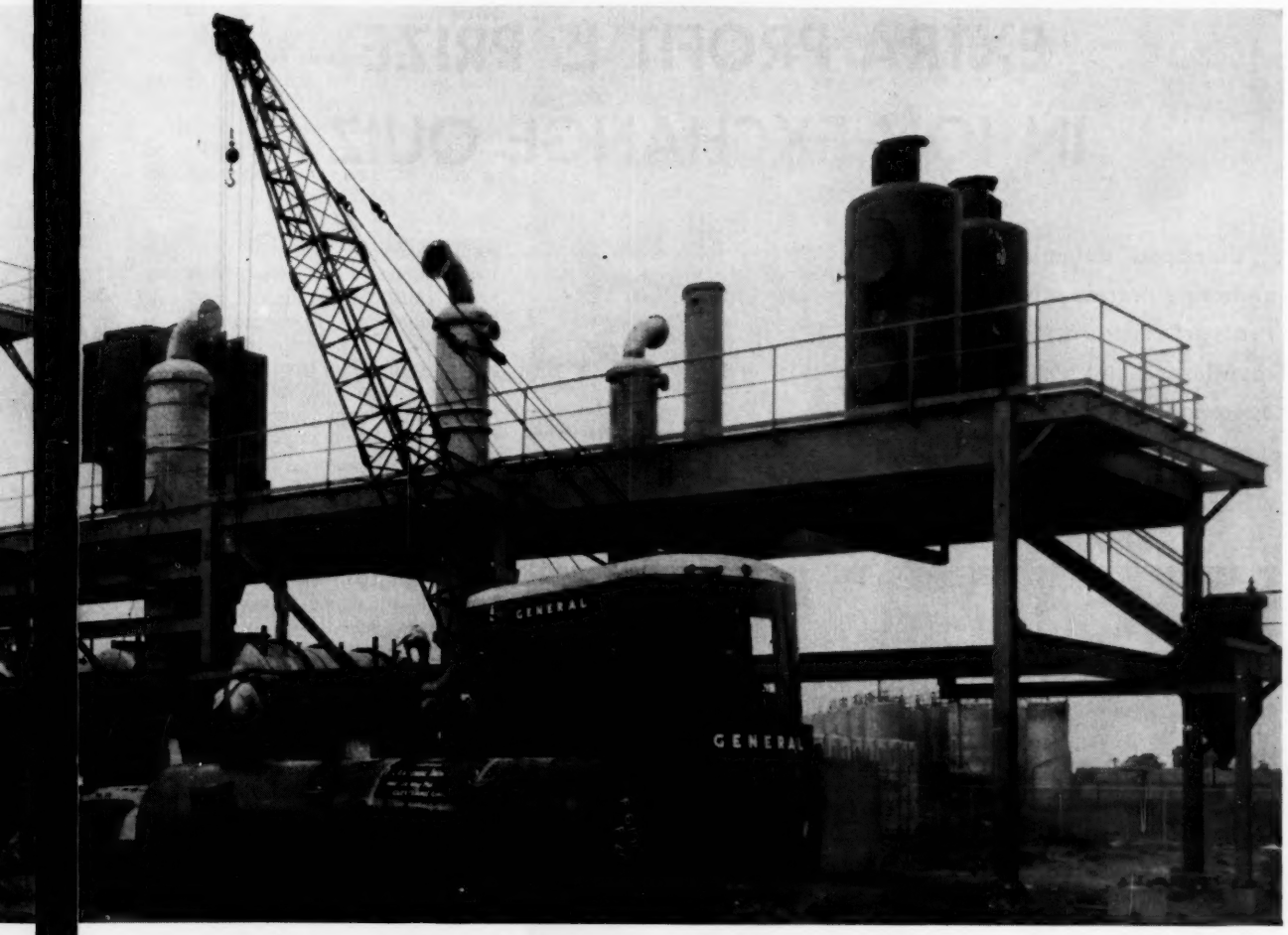


Design and Construction by Scientific Design Co., Inc.





SECTIONS OF PLANT BEGIN TO SHAPE UP....



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CHEMICAL NEWS . . . *secret to success*

"There are no secrets to success in this business," a chemical processor said recently. "There are just advances that you haven't heard about yet." In a field where new products and processes pop up like mushrooms overnight, it takes an alert eye to keep abreast of developments with profit potential. This series of chemical news notes will keep you posted.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

Route to:

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EXTRA PROFIT IS PRIZE IN ION EXCHANGE QUIZ

Untapped potential of ion exchange process offers opportunity for advancement in countless chemical processing operations.

"One of the highest paying quizzes in the country is going on right now in the chemical industry," a leading processing chemist recently stated. "The question that's worth the big money is 'where can you use ion exchange to advantage?' "

This is hardly an exaggeration of the potential of the ion exchange process. And the only competitor that the process engineer is working against is time.

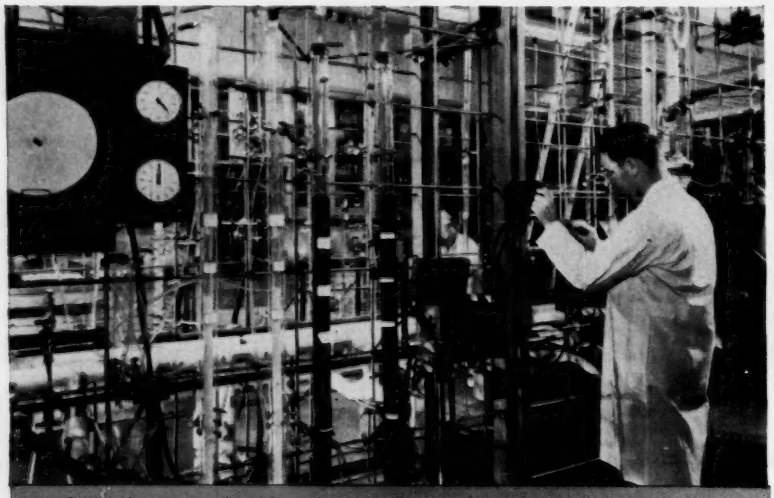
Ion exchange is proving its value in one field after another. Ion exchange is replacing old processes or doing jobs that have never been done before. In purification processes, they're using resins to recover chromate from plating solutions, to remove salt from glycerine, caustic from alcohol and salts from amino acids. In concentration applications, ion exchange is being used to recover uranium from acid solutions, zinc from spent spin bath solutions in rayon production, and streptomycin from fermentation broths.

Other areas of application are legion. The resins are being used for recovery, concentration and separation of radioactive wastes, for catalysis (as in the production of epoxides from unsaturated compounds) and for ion exclusion to deionize many organic products without the use of heat, electricity or chemical regenerants.

Dow, as a leading user of ion exchange resins in its own processes, is rapidly applying its knowledge to new areas. As a major producer of resins, Dow offers technical know-how and a dependable source of supply to companies aggressive enough to take advantage of the ion exchange processing potential.

Continuous resin development at Dow has resulted in countless application discoveries and product improvements—including the new tough, high capacity resin, Dowex® 50W.

A new Dow publication details factual information about ion exchange resins in text book fashion. A copy of this authoritative and important publication may be obtained on request.



Continuing research and product improvement (exemplified by Dowex 50W, new white resin) offer users information and skilled technical help.

CHELATION: price victory for processors

Speculating on the possibilities of chelation was a favorite pastime of processing engineers not too long ago. But that's as much as they could afford. The cost of chelating agents was just high enough to be out of reach of a lot of companies with metal ion problems.

No more. Recently, lower costs as a result of volume production made the use of chelating agents economical in many processing industries.

Many companies are now using Versene®, Versenol®, and Versenex* chelating agents to track down and inactivate trace metallic elements that once caused rancidity, odor, decomposition, discoloration and insoluble deposits in processes and finished products.

New Freeport, Texas, production facilities of Dow have eliminated worries with respect to supply for the many potential consumers of chelating agents. (And, incidentally, have made Dow a major producer.)

Anyone who uses water in processing or products should investigate the use of Dow chelating agents to clear up unruly metal ion problems.

DOWTHERM: takes the headaches out of heat transfer

Processors of everything from fried chicken to petrochemicals, who like to see a steady hand on their temperature gauges, are turning to Dowtherm® for their heat transfer medium.

As one food processor put it, "We were having trouble keeping batches uniform until we put in Dowtherm. Now we can get the temperature we want and *keep* it where we want it."

Oil companies who have switched to vapor phase heating with Dowtherm report that they've economized because less pumping is required to keep batches at a constant temperature and a smaller heat exchanger can be used.

Other firms report they're saving time that used to go to clean carbon from batch kettles. Lack of direct fire reduces carbonization to a minimum.

Processors who require pinpoint heat control in the 400°F. to 750°F. range without fire hazard can get full information on this unique organic heat-transfer medium by writing to Dow.

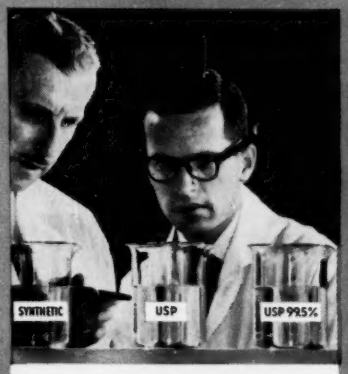
*TRADEMARK OF THE DOW CHEMICAL COMPANY

★ ★ ★ ★

IF THESE NEWS NOTES about processing chemicals are helpful we'd like to have your comments. For more information about any Dow chemical discussed in this advertisement, write to THE DOW CHEMICAL COMPANY, Midland, Mich., Chemicals Sales Department 7548.

MORE NEWS TIPS

for chemical processors

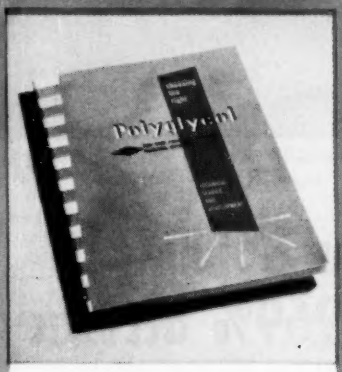


GLYCERINE

Two Dow plants now assure dependable supply of clear synthetic Dow Glycerine in three grades—synthetic (industrial), USP and USP 99.5%.

CAUSTIC SODA

You never have to wait or worry about caustic delivery when your order is handled by Dow's five producing plants and eight shipping terminals.



POLYGLYCOLS

Dow line of many polyglycols offers users the widest selection for varied uses. Write Dow today for more information and samples for evaluation.

BROMINE

Over 60 years of experience in producing bromine and brominated products is at your disposal from Dow to turn bromine problems into profit.

DOW CHEMICALS basic to the chemical processing industry

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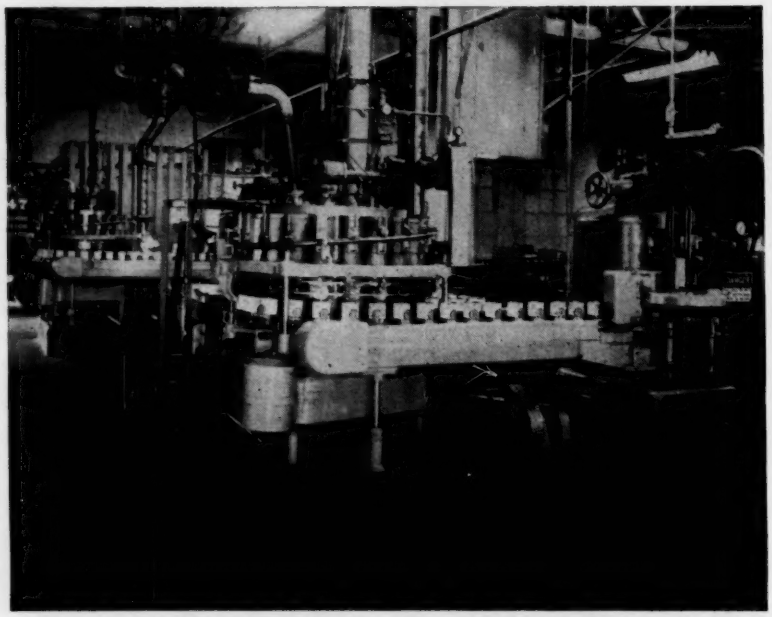


425 quarts a minute filled on this 21-station lube filler at Texaco plant. A total of three Pfaudler fillers handle all lube packaging requirements of the Port Arthur plant.

Filling without spilling at Texaco to 99.9969% accuracy

Texaco uses just three machines at its Port Arthur plant to fill a complete line of motor oils, hydromatic fluids, and antifreeze in quarts and gallons.

Two of these machines—RPL-21 type Pfaudler piston fillers—fill 410 to 425 quarts a minute. They each hold another 65 quarts a minute in reserve capacity. They fill at any viscosity over the complete temperature range 80° to 105° F.

The third machine — an RPL-7 Pfaudler filler — handles gallons at 60 to 80 per minute.

These machines permit the filling of cans with little or no spillage. As a result, the cans and shipping cases do not become oil stained. Accuracy of fill is maintained and maintenance of equipment is reduced to the minimum.

There are only three primary wearing parts on these Pfaudler fillers: piston and valve rollers and valve trip cams. All are inexpensive and easy to replace. There are no connecting rods or wrist pins to cause trouble.

Simple, positive adjustments of the can support rails eliminate product spillage by compensating for the centrifugal forces generated during high-speed filling. An accelerating infeed screw pushes cans in uniformly without jamming.

Cleaning is easy, too. You empty the bowl through a drain port, flush with kerosene, put the machine through a few revolutions, and it's clean.

There's more information about the complete line of Pfaudler fillers offered in the coupon.

New flush valve boasts one-piece glassed head and stem

When we took all the porcelain out of this bottom outlet flush valve, we eliminated a major cause of valve failure.

Head and stem are *one piece and glassed*. No cement. The seat is made of rigidized Teflon-glass fiber and its bevel mates with that of the spherical head. Rubbing the glassed head on the Teflon seat produces absolutely no static. The Teflon also has some "give" so you can get a firm seating without danger of cracking the head covering, a continual problem with the old porcelain designs.

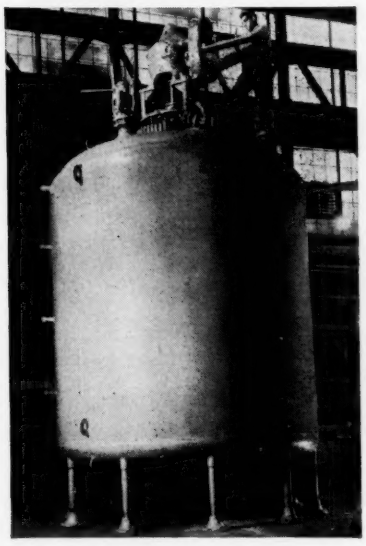
We don't have to tell you of the positive and leakproof sealing you

get with this ball-joint construction. And it's probably equally self-evident that the rounded, glassed head eliminates product build-up during processing.

So all there is left to tell is that the new design is interchangeable with existing valves you might now be using, and that the unit costs no more than a conventional stainless steel valve. Sizes range from 1½ by 1 to 8 by 6 in six different models.

Anything else you might want to know is covered in Data Sheet 42 which is offered in the coupon.

This is the most glassed-steel agitated reactor you've seen in one piece. O.D.: 120 inches. Height: 125 inches. Capacity: 7000 gallons. Material: glassed steel. It will be used to process monochloroacetic acid and alcohol at 158° F. The jacket is designed to take a 25 psi pressure at 350° F. This vessel uses a conventional three-blade impeller *without a foot bearing.* The agitator is set only 10 inches off bottom. *Moral:* We are ready to answer the most unusual process equipment requirements, and to glass any vessel from one-gallon lab units to giants like this. *For the record:* We've made vessels up to 35,000 gallon capacity for large volume storage and these are glassed, too!



130th Technical Course on maintenance and repair completed

Since we started our program of instructing maintenance and process men in the care and repair of glassed steel, more than 1800 men from more than 250 companies have graduated *cum laude.* The program started in 1941.

An interesting fact proves that these men and their companies have benefited from the instruction. Last year there was more than twice as much glassed-steel equipment in the field as in 1945. Yet we had far fewer units returned for factory repairs.

A goodly share of this improvement can be laid to the fact that we have improved our glass over the years as well as the design of the equipment and accessories. But much of the improvement must still be attributed to more effective preventive maintenance in the field and to more effective repairs made right in customer plants by customer personnel.

If you have some new men you'd like to take the course, either here in Rochester or near your own plant, please let us know. You can start by writing for a copy of the program describing the course's subject matter.

Check the coupon.

THE PFAUDLER CO., a division of **PFAUDLER PERMUTIT INC.**
Dept. CW-38, Rochester 3, N. Y.

Please send information on ☐ Bltn. 878 RPL Oil Fillers; ☐ Bltn. 964 RPL-36 Oil Fillers; ☐ DS-42 Flush Outlet Valve; ☐ Maintenance Class Program; ☐ Bltn. 947 Buyer's Guide.

Name.....

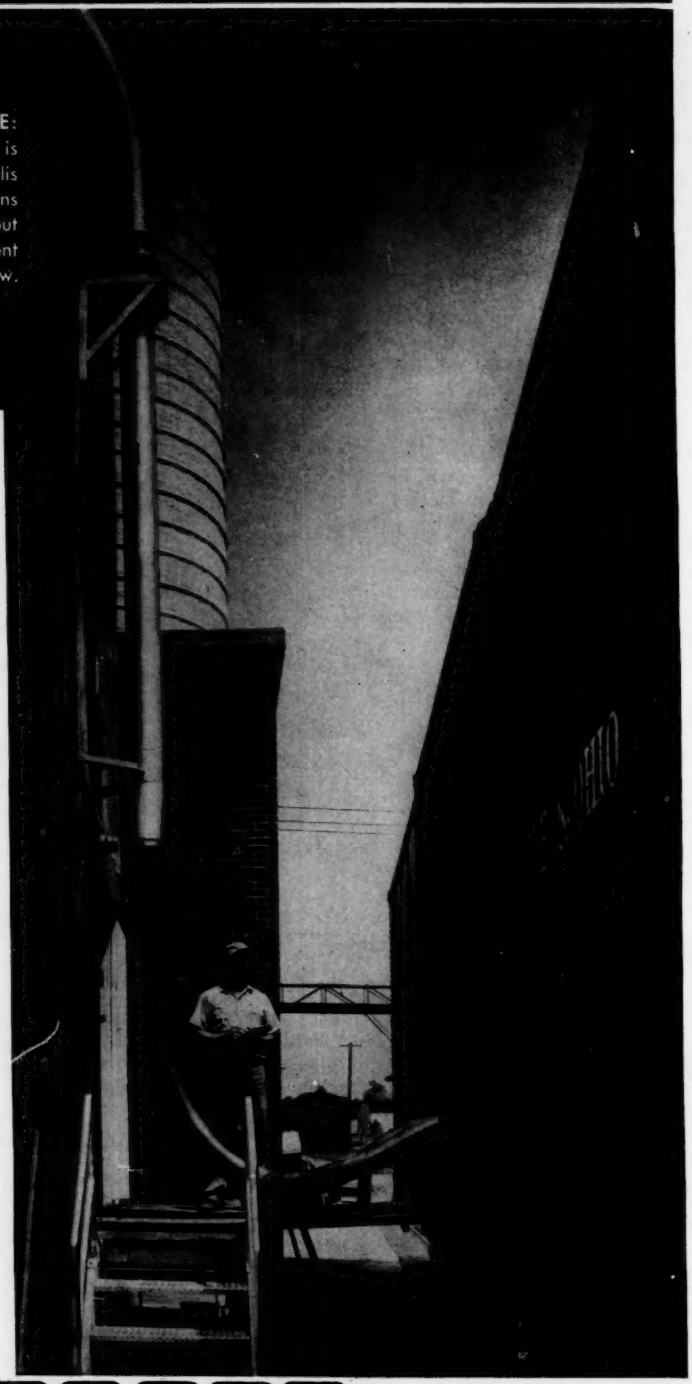
Title.....

Company.....

Address.....

City..... Zone..... State.....

flowing air moves bulk materials better



AUTOMATIC PRODUCTION STARTS HERE: This compact Airstream Conveyor installation is at Easton (Md.) feed mill of J. McKenny Willis & Son, Inc. Self-cleaning system unloads 25 tons per hour of soft meals for animal feed without dust, waste or mixing of meals. Vertical movement requires no more power than horizontal flow.

Efficient bulk materials handling is a major factor in any modern plant. Outmoded handling methods put a costly kink in production processes which are otherwise smooth and automatic.

A Dracco Airstream Conveyor can provide air-smooth bulk handling to supplement your other up-to-date operations. Airstream systems are readily adaptable to control and any degree of automation is possible. Versatile intake devices permit unmatched mobility in unloading areas. One-man supervision, with flow regulated from a central control panel, replaces costly manual handling.

Airstream Conveyors are enclosed and self-cleaning, permitting movement of different materials in quick succession without dust, waste or intermixing. Conveying lines require little space, conform easily to existing plant layouts, can be installed out-of-the-way without expensive structural supports.

For more information on how flowing air can move your bulk materials better and cut handling costs, call or write:

DRACCO DIVISION OF FULLER CO.
4080 East 116th Street • Cleveland 5, Ohio

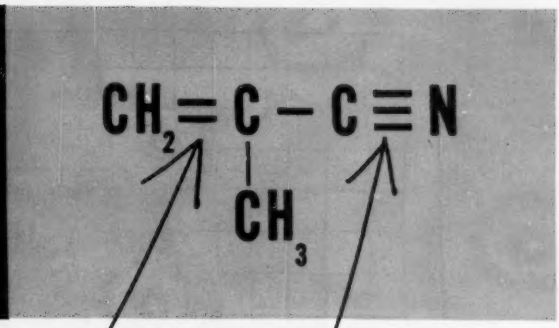
New 32-page brochure presents detailed information on how Dracco Airstream Conveyors have solved bulk materials handling problems. Write for Bulletin 530.

DRACCO *airstream* conveyors
dust control equipment

a new

Eastman

intermediate



vinyl linkage

cyanide radical

short molecule!

Methacrylonitrile

Of principal interest in homopolymers and copolymers, methacrylonitrile is similar in reactivity and function to acrylonitrile. The presence of the methyl group, however, introduces significant variations in such polymers, including greater solubility and lower melting point.

Eastman has developed a new process for the production of methacrylonitrile, which has resulted in the availability of this reactive intermediate in high purity. Here are a few of the areas in which the use of methacrylonitrile might be profitably investigated.

HOMOPOLYMERS

Polymerization of methacrylonitrile may be carried out by bulk, gel, or emulsion techniques. The resulting polymers are of value in molding compositions, films and coatings, fibers and foams.

Molding compositions. Polymethacrylonitrile can be compression-molded, with or without plasticization. Its physical properties lie between those of the commercial thermoplastic and thermosetting resins. Polymethacrylonitrile possesses excellent electrical properties and shows good chemical resistance to acids, alkalies, hydrocarbons, alcohols and esters.

Films. Clear, tough, flexible films of polymethacrylonitrile have been cast from solvent solutions producing smooth, glossy lacquer-type coatings of outstanding durability, suitable for protecting wood, glass or metal surfaces. These films may be plasticized, pigmented or dyed.

Fibers. Its greater solubility and lower melting point, as compared with polyacrylonitrile, make methacrylonitrile attractive as a component of fiber-forming copolymers.

Foams. Plastic foams of closed cell structure and good mechanical properties, particularly tensile and flexural strength, result from expansion of polymethacrylonitrile acetone gels.

COPOLYMERS

with Butadiene. Butadiene-methacrylonitrile copolymers are similar in physical properties to commercially available acrylonitrile copolymers, but exhibit significantly better processing characteristics. They require less power for milling, allow faster incorporation of powdered materials, are cooler milling, have lower elastic recovery and retain excellent processability after long periods of milling or calendering at high temperature.

As elastomeric plasticizers for vinyl resins, methacrylonitrile-butadiene copolymers show higher tensile and strength values, clearer films, higher plasticity and better milling and calendering characteristics than do acrylonitrile copolymers.

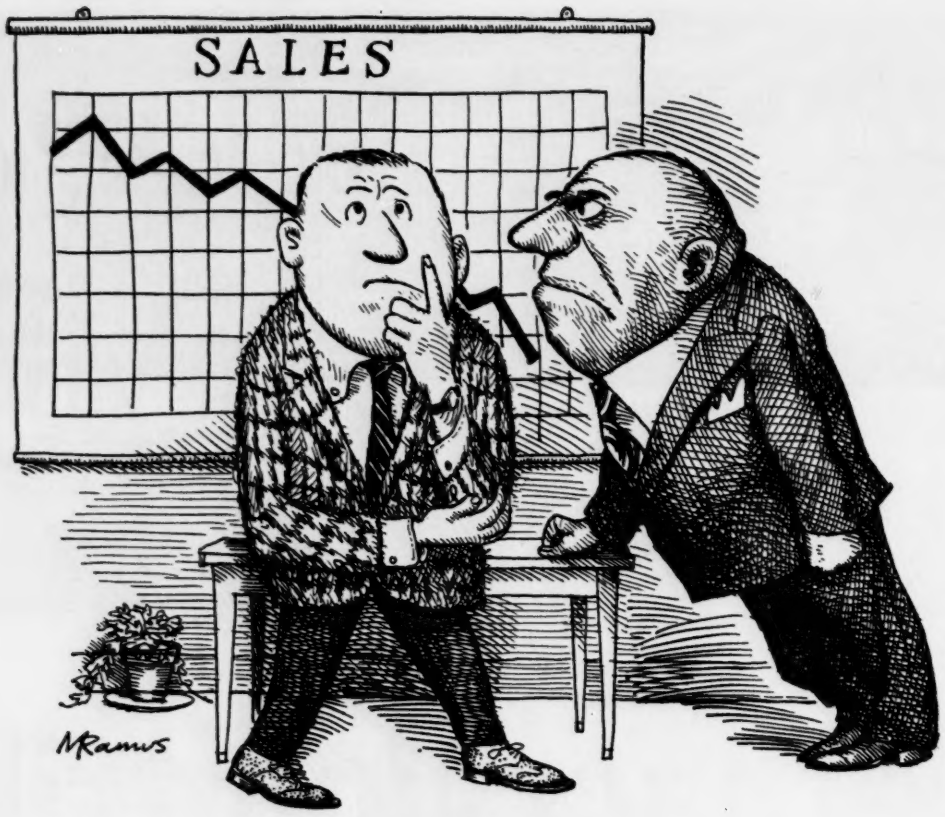
with Other Monomers. Copolymers may be made with vinylidene chloride, acrylic and vinyl esters, and styrene for preparation of threads, fibers and films. Interpolymers with various compounds are useful for lacquers, paints, insulation coatings, impact-resisting films, molded articles, glass substitutes, and as strengthening layers for safety glass and self-supporting films.

INTERMEDIATE

The reactivity of methacrylonitrile combined with its short molecule makes it an excellent intermediate for synthesizing a variety of acids, amides, amines, esters and nitriles.

For samples and further information, write to Chemical Sales Development Department, Chemicals Division, Eastman Chemical Products, Inc., Kingsport, Tennessee.

Eastman CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE, subsidiary of Eastman Kodak Company



The Perfect Solution

(nutritionally speaking)

"Cut out the brainstorming," roared the harassed sales manager to ivy league adman. "*Ruffage* breakfast cereal needs a *real* sales hypo."

Ivy league shrugged. "Okay, no dancing girls . . . *wait!* I've got a new wave length. Have you read about Pfizer *Lysine?* Terrific! It's something called an amino acid. Gives cereal products the high protein quality of meat or eggs. That kind of health bonus could really get *Ruffage* off the launching pad!"

The manager squints. "Boy, I think you may have it. Get Pfizer on the phone."

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

If you are considering amino acid or vitamin fortification of a food product (or, for that matter, if you need a food acidulant, antioxidant or preservative) get in touch with the Pfizer Chemical Sales Division. *For any problem which might be solved by a high quality organic chemical, think of Pfizer first.* Chas. Pfizer & Co., Inc., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.

Pfizer **CHEMICAL SALES DIVISION**

. . . sells more than 100 organic chemicals for food, medicinal and industrial uses.

Some bulk products of this Division are:

CITRIC, TARTARIC, OXALIC ACIDS AND SALTS • ASCORBIC ACID AND OTHER VITAMINS • CAFFEINE • ANTIBIOTICS • PLASTICIZERS

New!

from International Paper

TYON

An improved anti-skid treatment for Multiwall Bags!

Here is an anti-skid treatment for multiwall bags that really works. Inclined Plane tests of bags treated with "Tyon" show:

- *"Tyon" is 20% better than ordinary anti-skid treatments*
- *30% better than rough kraft*
- *40% better than standard kraft*

You can cut breakage loss—and danger from slipping, creeping stacks in the warehouse and on your trucks. Bags treated with "Tyon" stack to stay. They cling to pallets. Offer firm grip for fast, safe loading and unloading.

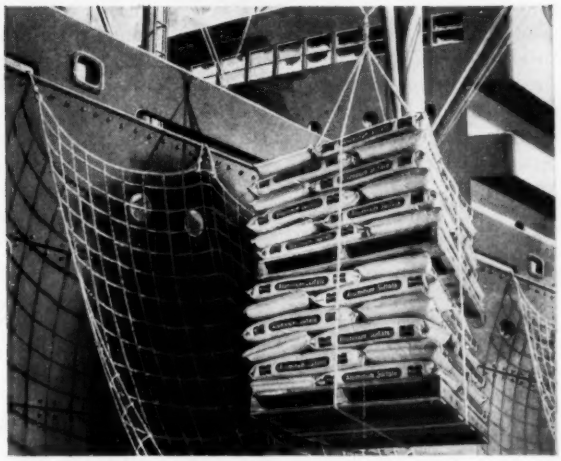
Remember, you get lots of advantages—with a lot of savings—when you specify multiwall bags treated with "Tyon"... another product of International Paper's long research and experience.

TYON

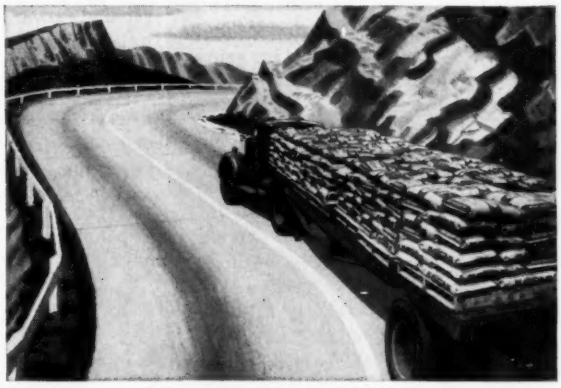
Look for this trademark on the bags you buy.

Send coupon for samples and full information

Up ramps and over bumps, bags treated with "Tyon" sit tight. *Allow faster handling.*



Stacked high or riding a sling, they cling. *Safer—resist slip and creep.*



Over bumpy roads, around curves, they ride—don't slide. *Eliminate breakage—speed delivery.*

your most dependable source of supply . . .

INTERNATIONAL PAPER

BAGPAK DIVISION, N.Y.17, N.Y.

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Please send samples and Tyon information.

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VIEWPOINT

IN THIS uncertain world, we can count only on death, taxes, and demands on management by organized labor. The latter will likely be more insistent in our industry if merger of International Chemical Workers' Union and Oil, Chemical & Atomic Workers is consummated. The merger plan has already been approved by ICWU's executive board and if the OCAW board does likewise, full merger could take place next year.

The potential strength of the new amalgamation would give its leaders opportunity to exercise industrial statesmanship of a high level. If it chooses, the union could be, with management, a partner for profitability. But its strength could, on the other hand, tempt it into actions that would weaken and possibly rend our industrial fabric.

One such potentially disruptive action might be a rule-or-ruin insistence on company-wide bargaining. Productivity and profitability vary widely from product to product, plant to plant. Suppose the same employer owned a synthetic detergents plant in New Jersey and a fertilizer plant in Mississippi: if he had to pay the same wages at both, he might well have to sell his fertilizer plant—probably to a co-op. Some issues—such as pensions and insurance—may be legitimate and practical for company-wide bargaining, but wages and hours certainly aren't among them.

Another such action would be an industry-be-damned contest with a rival union—District 50 of United Mine Workers, say. The winner of such a contest would be the union that delivered the largest package to its members — regardless of whether the package might eventually cost the members their jobs.

It's to be hoped that the prospective merger may lead to the mutually beneficial kind of industrial relations displayed recently between union and employers in the lithography business—and not to mutually costly strife.

Editor-in-Chief

OPINION

Put Patents to Work

TO THE EDITOR: I was very favorably impressed with your editorial *(Aug. 23, p. 15)*.

I, too, have been advocating the importance of putting government-owned patents to work. Along these lines, I would like to invite your attention to an article I have written, "Federal Employee Invention Rights —What Kind of Legislation" *(Journal of the Patent Office Society*, July '58, p. 468). . . .

While my views are purely personal and, of course, do not necessarily represent those of my employer, I would like to express the hope that you and other publishers will continue to call the public's attention to the desirability of obtaining some formal program whereby patents taken out on inventions made by or for the government will be put to work as only exclusive licenses under such patents can possibly do.

HOWARD I. FORMAN
Patent Dept.
Rohm & Haas Co.
Philadelphia

ABS Resin for Pipe

TO THE EDITOR: Your article on the future of plastic pipe *(Aug. 9, p. 77)* describes this important and rapidly growing outlet for plastic materials in a very informative way. . . .

Marbon has just recently brought two new Cycolac polymers on the market . . . suited for the production of ABS [acrylonitrile-butadiene-styrene] pipe, namely Cycolac LL resin and Cycolac C resin. . . .

HOWARD H. IRVIN
Technical Director
Marbon Chemical Division
Borg-Warner Corp.
Gary, Ind.

No Butyl in Wax

TO THE EDITOR: In your excellent summation of the current (wax) situation appearing in the July 19 issue of CHEMICAL WEEK, we noted a single error. This was the statement on page 53 that "Sun Oil Company is shipping tank cars of 75% microwax-25% butyl rubber to its large users of laminating grades of wax."

The fact of the matter is that we are currently blending no butyl rubber whatever in our laminating wax. We do blend polyethylene and microwax with a special paraffin for the milk carton industry. I feel the item concerning our laminating wax should be corrected in order to reassure customers who have asked us for such blends and who have been advised that we market no such product.

F. J. MCNAMARA
Sun Oil Co.
Philadelphia

All Disassociated

TO THE EDITOR: In your article concerning the U.S. patent system *(July 12, p. 63)*, you report on Professor Melman's findings prepared for the Congress. In doing so, however, some distortion was allowed that I believe should be corrected. I refer to the statement that "Sen. O'Mahoney carefully disassociates himself from Melman's conclusions."

All of the reports prepared for the Senate subcommittee have statements that the conclusions are those of the author and not those of the subcommittee or its members. This statement appears in 14 reports prepared by authors on this subject for the Congress.

SEYMOUR B. ALPERT
Princeton, N. J.

MEETINGS

American Institute of Chemical Engineers, national meeting, Utah Hotel, Salt Lake City, Sept. 22-24.

CMRA, market research conference, French Lick-Sheraton Hotel, French Lick, Ind., Sept. 24-26.

Fiftieth Anniversary of the Teaching of Rubber Chemistry; ceremonies establishing the Rubber Science Hall of Fame; University of Akron campus, Akron, O., Oct. 3.

Paint Industries Show, 1958, and annual meeting of the Federation of Paint and Varnish Production Clubs, Cleveland Public Auditorium, Cleveland, Oct. 6-8.

American Institute of Mining, Metallurgical and Petroleum Engineers, solid-fuels conference, Chamberlain Hotel, Old Point Comfort, Va., Oct. 9-10.

Packaging Institute, 20th annual forum, Edgewater Beach Hotel, Chicago, Oct. 13-15.

American Institute of Consulting Engineers, annual dinner, Waldorf Astoria Hotel, New York, Oct. 14.

ONE OF A SERIES

Printed by offset lithography on 70-lb. paper containing Wyandotte PURECAL® in the coating.

After the sale...what?

(The "why" of Wyandotte technical service)

Many years ago, we learned that if we were going to introduce new chemicals which had unique characteristics, some form of application help was necessary.

We also discovered that buyers were asking themselves: "Is my supplier reliable? What about his product? Are his research facilities adequate for our needs? Will I get quick action from him when I need service?"

From these needs grew our present-day concept of technical service.

At Wyandotte, technical service is an integrated part of our over-all operation. It crosses all corporate lines. It is ever-present in procurement of raw materials, research, manufacturing, sales, shipping, and, of course, servicing.

It encompasses many activities including: furnishing such fundamental information as chemical and physical properties along with other pertinent characteristics of our products; recommending handling procedure; inspecting manufacturing operations in our plants and in those of our customers (on request); instructing customers' personnel on safety measures.

In addition, our technical service is responsible for quality control, packaging and loading, complaint handling, and all-around trouble-shooting in the customers' behalf.

Why do we do all this?

Because we've found that good technical service builds customer satisfaction, insures product success, avoids emergencies.

We have also learned by experience that, in order to be good, technical service must be deep-rooted and sincere.

And, while you may never require Wyandotte technical service in your plant, it's an assuring feeling to know that it is operating in our organization continuously in your behalf.

For a pictorial presentation of Wyandotte technical service in action, turn the page.

WYANDOTTE CHEMICALS

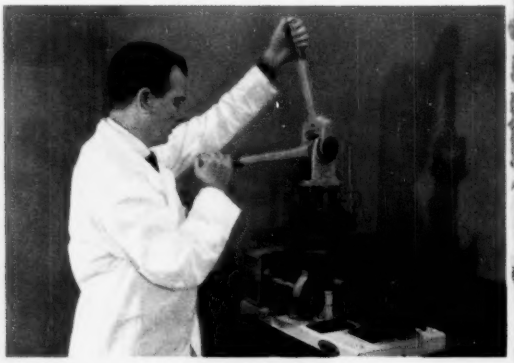
SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE • MURIATIC ACID • HYDROGEN • DRY ICE
GLYCOLS • SYNTHETIC DETERGENTS (anionic and nonionic) • CARBOSE® (Sodium CMC) • ETHYLENE OXIDE • ETHYLENE DICHLORIDE • PROPYLENE OXIDE • PROPYLENE
DICHLORIDE • POLYPROPYLENE GLYCOL • DICHLORODIMETHYLHYDANTOIN • CHLORINATED SOLVENTS • OTHER ORGANIC AND INORGANIC CHEMICALS

Stretching dollars for rubbermakers

. . . an example of Wyandotte technical service at work

1 A large rubber company ran into a snag with a formulation for a new line of tires. The problem: white-sidewall tires were cracking on low mileage test runs. As one of the first steps toward a solution, the company's tire compounder called in a Wyandotte technical-service representative. Here they examine a faulty tire on a test car.

2 The problem was taken to the Wyandotte research center and turned over to scientists in the pigment-research laboratory. They studied the company's rubber compound from many angles . . . decided uneven curing rates of wall and tread components were at fault. PURECAL, Wyandotte's precipitated calcium carbonate, was introduced in formulas for white-sidewall stock—each adhering to requirements for wearability, strength, whiteness.



3 In developing these new rubber formulations, the Mooney Viscometer helped determine processing safety factors and proper viscosity flow for molding. Characterizing developmental stocks typifies Wyandotte's thorough approach to customer problems.

4 A final report containing Wyandotte's laboratory findings, along with full technical data on PURECAL, was submitted to the research director of the rubber company. It will serve as a guide for further research and development in their own laboratory.

Wyandotte
CHEMICALS

Pacing progress with creative chemistry

Wyandotte PURECAL* is solving problems for many industries . . . making better white-sidewall tire stocks, improving paints, giving smoother finishes for paper. And it's backed by the highest caliber technical service, as demonstrated on this page—available to all Wyandotte customers. If you have a problem that falls within our technological background, check with us—our approach is designed to provide answers. *Wyandotte Chemicals Corporation, Michigan Alkali Division, Wyandotte, Mich. Offices in principal cities.*

*Reg. U.S. Pat. Off.

CHEMICAL HAULING MADE EASY... AND ECONOMICAL!

Fruehauf Tank Engineering Achieves Maximum Payload For Professional Acid Transporter Harold Waggoner & Co.

PROCESSORS OF CHEMICALS are transferring more and more of their freight each year to the bulk Tank-Trailer method of shipping, for two financially important reasons: *speed and economy.*

Barrel handling is eliminated, routing delays are removed, inventories at destination can be reduced, and customer good will is increased wherever direct, rapid, efficient Trailer transport has been introduced. Scientific Trailer engineering by Fruehauf has produced specialized, high-capacity units capable of carrying practically any liquid or powdered chemical produced in America—safely and speedily.

Among the countless professional liquid haulers who rely on such Fruehauf equipment for dependable, profitable, efficient shipment is Harold Waggoner & Co., Granite City, Illinois. This firm's 15 Fruehauf Acid Transports were designed to carry maximum-size cargoes in 8 different states. Considering the variation in local weight laws, this is no mean engineering feat.

Waggoner hauls liquids from East St. Louis, Illinois, to the East Coast, and has operated Fruehaufs since 1954. Like most other specialized haulers, Waggoner finds Fruehauf Finance plans and nationwide service facilities helpful because they are geared to the hauling business. If you ship or transport a liquid chemical, you too will find it profitable to investigate Fruehauf Tank-Trailers.

For Forty-Four Years—More Fruehauf Trailers On The Road Than Any Other Make!

FRUEHAUF TRAILERS

World's Largest Builder of Truck-Trailers

FRUEHAUF TRAILER COMPANY

10948 Harper Avenue • Detroit 32, Michigan

PLEASE SEND FULL FACTS, WITH NO OBLIGATION, ON FRUEHAUF CHEMICAL TRANSPORTS

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COMPANY _____

ADDRESS _____

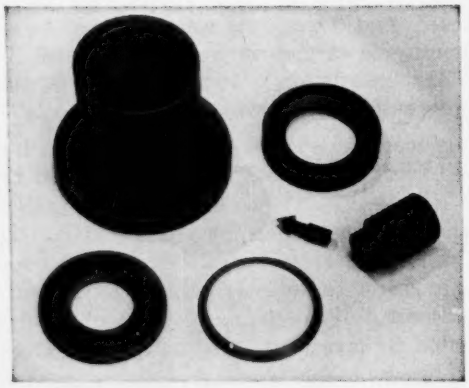
CITY _____ STATE _____

NEW Polypenco® K-51 Penton† Stock Shapes and protective finishes make economical anticorrosion parts

†Trademark of the Hercules Powder Company

Stock shapes of POLYPENCO K-51 Penton include a wide variety of sizes and forms.

Typical applications of CORVEL K-51 Penton Finishes include impeller, Rockwell-Nordstrom valve and valve plug, and other parts where corrosion is a factor.



Component parts used in the chemical industry—machined from POLYPENCO K-51 Penton shapes.

Solve your toughest corrosion problems the economical way with POLYPENCO K-51 Penton standard shapes—rod, tubular bar, strip, sheet, pipe and tubing.

Machining to close tolerances is quick and easy on standard metalworking equipment, with minimum fabrication costs.

Or, where metal rigidity may be needed, investigate cladding with CORVEL* K-51 Penton Finishes, specially processed for use with the WHIRLCLAD® Coating Process—for economical protection against corrosive gas or liquids.

Typical successful applications in the chemical industry include:

- Stock shapes—gears, bearings, rollers, washers, tank linings, valve seats, gaskets and packings, etc.
- CORVEL Finishes—impellers, valves, and chemical processing equipment of all types subject to extreme corrosive conditions.

Prove to yourself that POLYPENCO K-51 Penton stock shapes are your economical answer to severe corrosive applications. Contact your local POLYPENCO representative or write today for detailed information or engineering assistance on your specific problem.

*Polymer Corporation trademark for finishing materials.

THE POLYMER CORPORATION

Reading, Pennsylvania

Export: POLYPENCO, Inc., Reading, Pa., U.S.A.

POLYPENCO Nylon and NYLATRON® GS, POLYPENCO Teflon§ and NYLAFLOW®

§DU PONT TRADEMARK

POLYPENCO

FOR CORROSION RESISTANCE AT ELEVATED TEMPERATURES

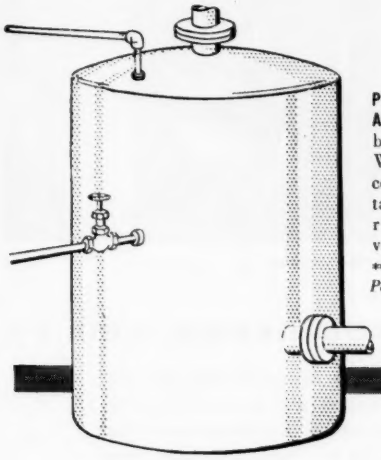
check the Penton* package

A completely new thermoplastic with a broad spectrum of corrosion resistance, Penton may well supply the answer to some of your toughest corrosion problems —particularly at elevated temperatures.

The unique combination of mechanical and chemical-resistant properties found in Penton, combined with the ease and economy with which it can be fabricated, makes this new material ideal for the production of anti-corrosive equipment in many forms. Although new as a commercial product, Penton has been thoroughly evaluated and its usefulness proven in many tough corrosive exposures even at temperatures exceeding 300°F.

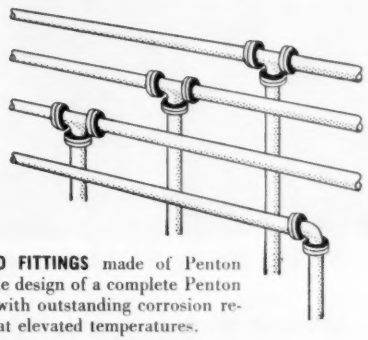
Check the advantages of the proved-in-use Penton package for complete processing systems. Valves, pipe and fittings, pumps and meters, flame-sprayed or Whirlclad** metal parts—all are now available for immediate use offering the extra protection of Penton. We'll be glad to put process equipment users in touch with a manufacturer who now offers Penton products.

Whether you are a user or manufacturer of processing equipment you'll want to know more about Penton. Write for a copy of "The ABC's of Penton for Corrosion Resistance" or the technical brochure designed for equipment manufacturers.

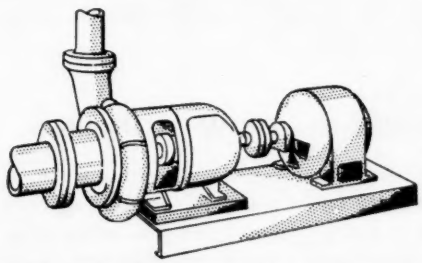


PENTON COATINGS AND LININGS applied by flame-spray or the Whirlclad Process** convert ordinary metal tanks into highly corrosion-resistant vessels.

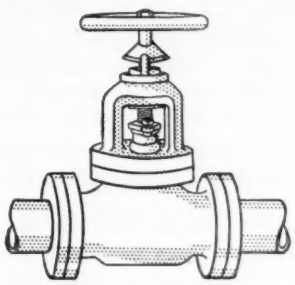
***Trademark of The Polymer Corporation*



PIPE AND FITTINGS made of Penton enable the design of a complete Penton package with outstanding corrosion resistance at elevated temperatures.



PUMP AND METER PARTS molded with Penton or made with Penton-clad metal extend the usefulness of this new plastic in processing systems.



PENTON VALVES of many types, solid or lined, can now be obtained in sizes up to 6 in., meet many service needs previously requiring higher-priced glass or metal alloy parts.

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

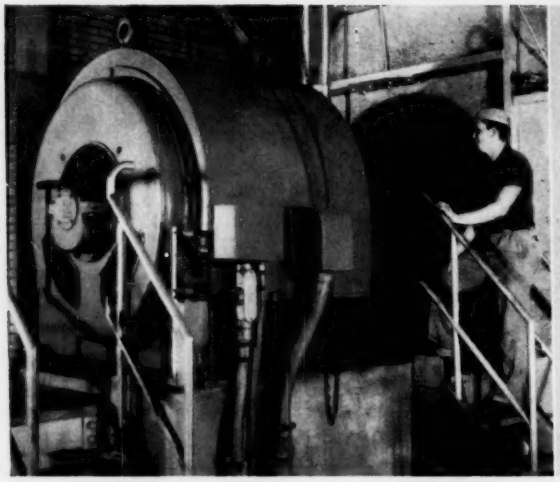
900 Market Street, Wilmington 99, Delaware

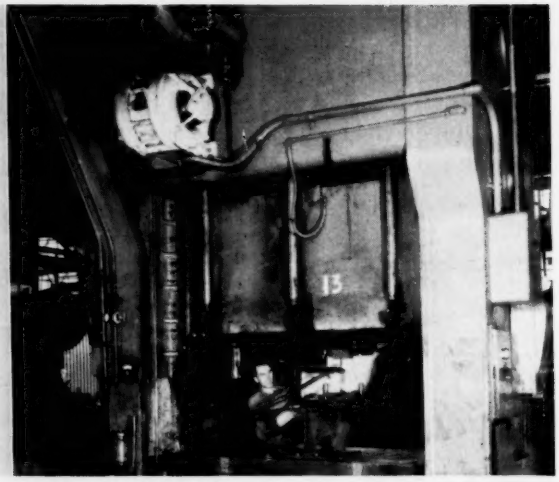
CP58-6 (R)

** Hercules Registered Trademark for Chlorinated Polyether*

stop costly motor failures...

WITH DOW CORNING SILICONE INSULATION





Silicones handle overloads for a fan motor here . . . . and here up-rate the power of a press

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Business
Newsletter

CHEMICAL WEEK
September 20, 1958

CPI expansion plans are sprouting thick and fast this week.

•

• Anlin Co. (Houston, Tex.) will build a 150-tons/day sulfur recovery plant in the St. Louis area. The chemical firm has bought a 12-acre site at Hartford, Ill., alongside Shell Oil Co.'s Wood River refinery, which will supply hydrogen sulfide-containing gas. Construction of the $2-million plant is slated to start in about a week.

• Glidden will put up a $2-million-synthetic levomenthol plant as part of its Organic Chemical Division at Jacksonville, Fla. Glidden claims that the unit will be the first to provide a synthetic replacement for natural levomenthol, will be able to supply 40% of total U.S. needs. The company is embarking on an "intensified program for the further development of other of its aromatics."

• Shell Chemical Corp. will start building a phenol and acetone unit at its Houston, Tex., plant early next year. Most of the output will be used for making bisphenol A, one of two principal ingredients of Shell's epoxy resins (*CW, Sept. 13, p. 31*). Shell's parent company, Shell Oil, will also take part of the phenol.

•

Dow Chemical is shooting for $1 billion in sales by '61, President Leland Doan told stockholders last week at their annual meeting. Sales have already begun to turn up slightly since fiscal '58 closed on May 31, Doan said. Total sales for the past year dropped about 5.5%, to $636.2 million. But profits, which dropped 15.5%, are still being squeezed. Causes: "inflexible prices in the face of rising costs," keener competition, and "a new kind of competition from numerous companies that have branched out into chemical manufacture, often by the relatively economical procedure of buying processes."

Dow will continue to push research and development, Doan promised. The goal: 10% of total sales in products not more than five years old.

And Dow's employees will get another chance to up their stake in the company's future by buying common stock via a new stock-purchase plan. For sale: 175,000 shares of common stock. In past years, more than 40% of the eligible employees subscribed.

•

Reichhold Chemicals' sales, too, are continuing their ascent. August sales broke monthly records, hit $6.7 million, compared with $6 million in Aug. '57. They brought first-eight-month sales up to $47.3 million, well over the '57 period's $44.5 million.

•

A third huge international atomic conference appeared to be in the making last weekend as the United Nations' second "atomic spectacular"

closed in Geneva. Despite widespread private opinion that future meetings of such scope cannot be justified (*CW, Sept. 13, p. 34*), Lewis Strauss, chairman of the U. S. delegation, said gains more than balanced liabilities. The delegation will recommend that the government propose a third conference after a three-year period.

Problems the conference brought into more realistic focus:

- Thermonuclear energy in central power stations is a long way off. Edward Teller, director of University of California's radiation laboratory, does not believe that practical applications will appear in this century.

- Because atomic fission appears to be the only feasible nuclear power source in the near future, the radioactive waste disposal problem cannot be ignored, must be attacked head-on.

•

Rayon producers are taking the offensive against nylon in the battle for tire-cord markets. Five companies have formed American Tyrex Corp. to enforce quality standards and promote the Tyrex certification mark. Use of the new name, rather than "rayon," is a means of promoting the improvements that have gradually taken place in cellulosic yarns over the last several years—improvements that, the producers say, make today's Tyrex a different product than yesterday's rayon.

Members of the new group: American Enka Corp., American Viscose Corp., Beaunit Mills, Courtaulds (Canada), Industrial Rayon. Heading it is William Dalton, who is also president of American Rayon Institute.

•

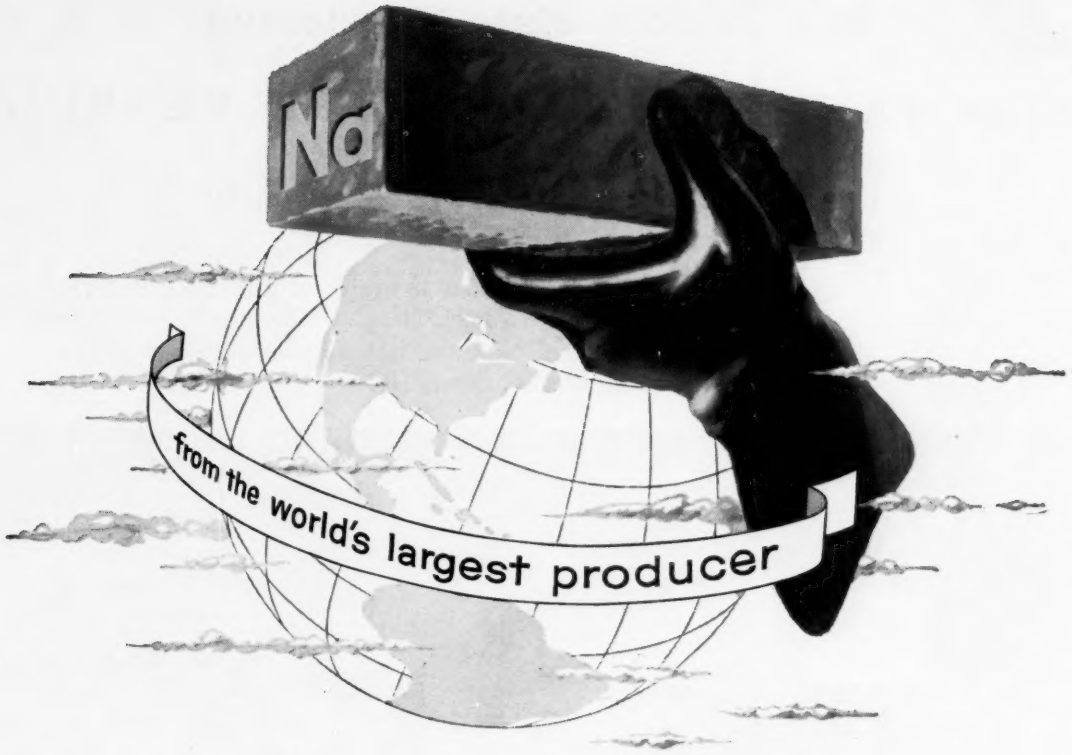
Chemical shippers face higher freight rates. Interstate Commerce Commission has approved a $1.20/ton increase on all water-borne port traffic handled by railroads, a boost in port charges to $2.86 and $4.09/ton (depending on service rendered), a 5% increase in switching charges, and a 10% increase in charges for stopping a shipment for partial unloading or to complete loading.

•

Hooker Chemical may transfer phosphorus chemicals manufacturing operations from Niagara Falls, N. Y., to Columbia, Tenn. Reason: rising freight rates and higher electric power costs. A Hooker spokesman (at press time) emphasized that no decision had been made.

•

Three new pollution control regulations for Ohio River Valley process industries are now officially on the books. Last Friday, Ohio River Valley Water Sanitation Commission (ORSANCO) members: unanimously adopted the compromise chloride control program that had been proposed last spring (*CW, May 10, p. 23*); readopted the toxicity control measure that had been in effect prior to '55; adopted a resolution providing that precautions must be taken so that oil won't escape into the stream.



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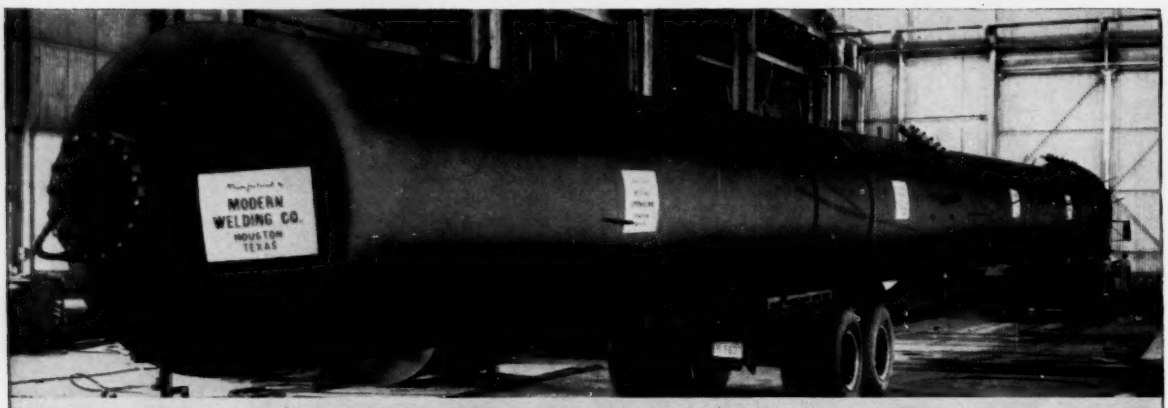
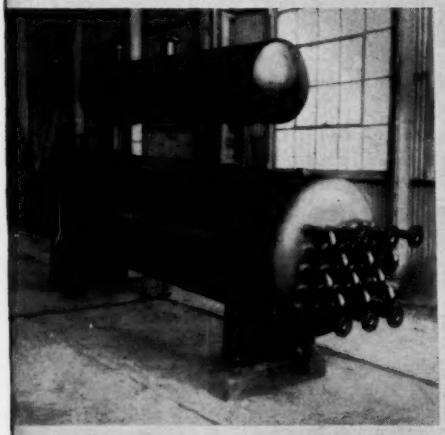


Fractionating Column—72" Dia. X 110'-0" length, ¾" wall thickness with 40 trays. All welds 100% X-ray quality. Constructed for internal pressure and full vacuum. Stamped A.S.M.E. Code. Total weight 83,000 lbs.



Heat Exchanger — Lower Section 4'-0" dia. X 14'-0". Upper Section 1'-8" dia. X 10'-0". ⅝" Carbon Steel Plate Wall. A.S.M.E. Code construction using tube bundle of schedule 160 pipe.

Styrene Stripping Column—9'-6" Dia. X 80'-0" length, ½" plate walls and ⅝" heads. Constructed and stamped A.S.M.E. Code. Vessel contains 14 stainless steel perforated trays, 16 manways, 146 couplings, and nozzles. Total weight 72,000 lbs.

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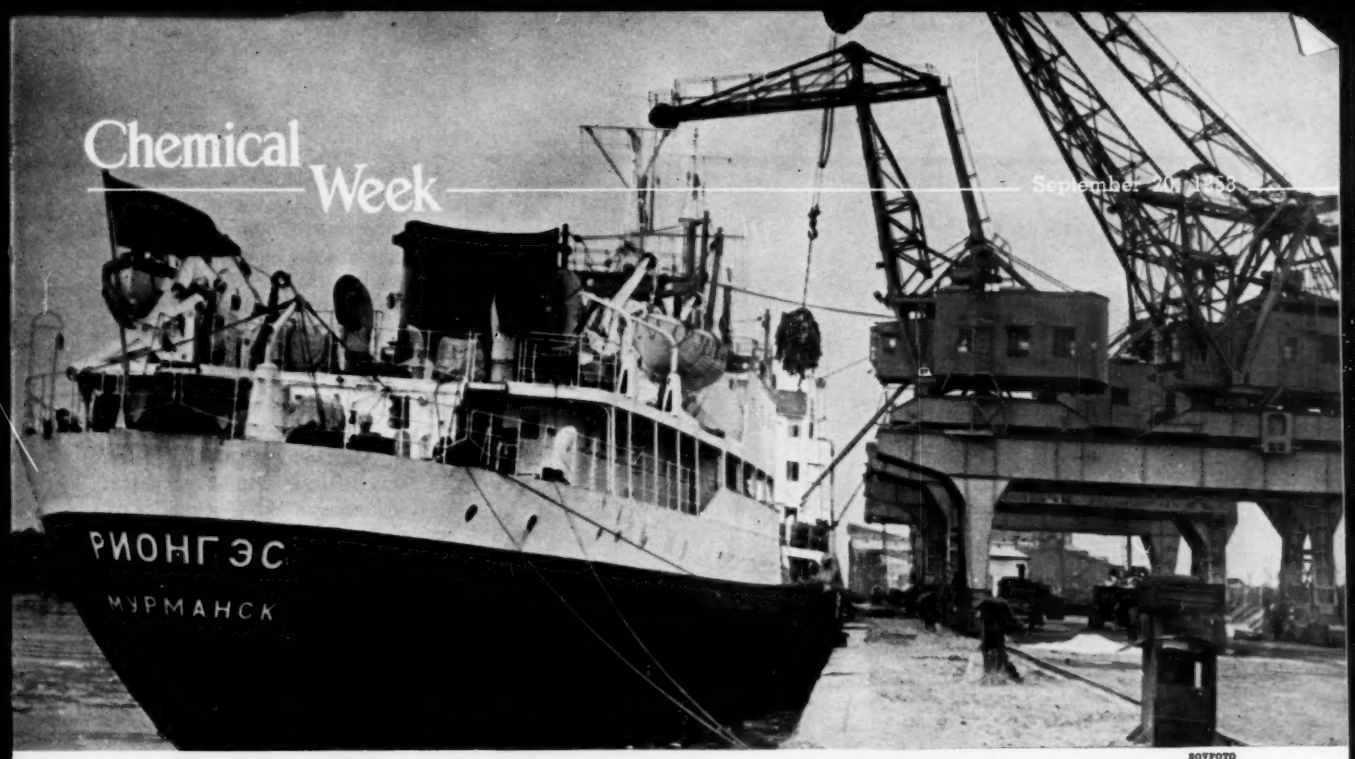


SOVFOTO

Highlights of Russia's Foreign Chemical Trade

15 TOP IMPORTS	1955	'56	'57
IN THOUSAND METRIC TONS			
Benzene	1,987.9	2,021.7	2,022.9
Raw naphtha	574.8	1,509.9	1,331.4
Sulfur	12.5	58.0	93.8
Soda ash	108.2	143.0	71.9
Sodium sulfate	45.2	55.1	63.8
Calcium carbide	67.3	47.0	58.9
Caustic soda	33.7	68.6	48.0
Ethyl alcohol	21.2	57.5	25.4
Paraldehyde	39.6	40.4	5.0
IN MILLION U.S. DOLLARS*			
Dye, lacquer and tanning chemicals	$7.5	$13.4	$15.3
Pigments, colors	6.6	12.1	13.4
Drugs, toiletries, cosmetics	3.2	5.9	12.7
Intermediates for plastics	7.6	11.2	11.0
Medicines	2.5	5.2	10.4
Fertilizers and insecticides	4.4	4.5	8.8

15 TOP EXPORTS	1955	'56	'57
IN THOUSAND METRIC TONS			
Phosphatic fertilizers	955.4	1,196.4	1,389.0
Glycerine	787.0	856.0	3,817.0
Potash fertilizers	46.0	107.0	221.2
Diphenylamine	77.0	293.0	202.0
Benzene	87.7	139.1	164.9
Cellulose	137.4	145.8	150.5
Nitrate fertilizers	116.7	112.9	119.1
Aluminum	41.6	59.9	85.4
Ammonium chloride	58.1	56.7	71.0
Ammonium sulfate	58.2	56.2	47.6
Soda ash	28.6	22.4	42.0
Sulfur	29.7	25.5	40.9
IN MILLION U.S. DOLLARS*			
Fertilizers and insecticides	$24.3	$30.208	$39.1
Medicinals	5.9	6.4	6.4
Dye, lacquer and tanning chemicals	8.7	6.8	6.3

*At U.S.S.R.'s official four-rubles-to-the-dollar rate. (Free-currency rate: 39-to-the-dollar.)

Taking Wraps Off Russia's Chemical Trade

Recently released figures on Russia's chemical commerce reveal how much the U.S.S.R. is relying on foreign trade in building up Soviet industry. And the chemical figures—presented here for the first time in the U.S.—place in perspective the threats and opportunities of increasing East-West trade—problems that are now occupying U.S. chemical producers.

Compared with U.S. trade figures, the Russian totals are not staggering. Russia valued its 1957 exports of chemicals and allied products at an estimated 1.38 billion rubles. At official exchange rates, this is about $346 million. Worth of U.S. exports of chemicals and related products, by comparison, totaled $1.4 billion.

But some individual items stack up impressively against comparable U.S. exports. Russia shipped out 1.4 million metric tons (1.55 million short

Satellites' Non-Soviet Chemical Trade

(In thousand U. S. dollars at official exchange rates. Source: Government reports to the United Nations.)

1957 EXPORTS

TO	From Poland	From East Germany	From Czecho-slovakia	From Bulgaria	From Hungary
United States	$4,261	$1,603	$1,081	$290	$10
United Kingdom	3,321	3,630	470	164	86
West Germany	2,420	—	5,188	181	303
France	182	1,138	327	502	76
Italy	492	1,530	938	3	98
Austria	38	998	751	—	749
Belgium-Luxembourg	271	3,039	355	—	286
Netherlands	738	2,176	407	12	86

1957 IMPORT

FROM	To Poland	To East Germany	To Czecho-slovakia	To Bulgaria	To Hungary
United States	27	—	152	—	193
United Kingdom	2,468	354	1,816	225	1,899
West Germany	7,961	—	8,602	2,209	4,480
France	2,200	877	1,600	390	632
Italy	692	278	1,229	123	1,100
Austria	403	773	1,107	533	6,459
Belgium-Luxembourg	3,180	1,234	357	243	317
Netherlands	3,194	2,495	2,114	54	518

Russia's Non-Soviet Chemical Trade

EXPORTS TO—

	1955	1956	1957
United States	$4,199	$10,682	$7,382
Finland	3,085	3,542	3,086
West Germany	2,601	971	2,627
Yugoslavia	224	839	1,976
Italy	890	1,368	1,383
United Kingdom	1,346	807	757
Belgium-Luxembourg	1,120	913	681
Sweden	261	557	654
Turkey	598	439	640

IMPORTS FROM—

	1955	1956	1957
France	2,243	3,517	3,722
West Germany	677	2,408	3,590
Yugoslavia	914	2,187	3,170
Italy	558	1,597	2,530
Netherlands	379	996	1,523
Finland	85	652	1,149
United Kingdom	43	524	1,055
Canada	—	12	973
Austria	—	339	788
Belgium-Luxembourg	17	28	424
United States	132	24	301

tons) of phosphatic fertilizer materials last year, for example, while the U.S. exported only 15,639 short tons. The Russian figures may include phosphate rock. While Russia exported 206,400 metric tons (228,000 short tons) of coal-tar pitch, the U.S. shipped 52,200 short tons.

Matching this nation's and Russia's export lists points up the shape of possible competition between producers of the two countries for world markets. Basically, Russia's export list is weighted with heavy quantities of a comparatively few basic chemicals. For a long time, its competition will likely take the form of dumping some of these basic materials at cut-rate prices; U.S.S.R. is in no position to match the broad spectrum of chemical products offered by U.S. and western European producers.

Will Trade Aid? But Russia's oft-proclaimed interest in trading with the West lies primarily not in the realm of export competition—not, at least, for the present—but in the area of import aid for the vast Soviet industrial expansion now under way.

Russia, in short, needs the vital chemicals that the West can provide. But government officials in the U.S. State and Commerce Depts. as well as private management are wondering how low the U.S. can drop the trade bars with Communist countries without damaging U.S. national and commercial interests.

The question has been prompted lately by Russian Premier Khrushchev's overtures for more trade, and by pressure from western European business men, who have succeeded in getting the Cocom trade restrictions eased. U.S. officials are now mulling over how far they dare go along. Their decision is due soon.

Whatever the U.S. government's decision, East-West chemical trade is not expected to boom suddenly. Russia's import goals are pinched by a dollar shortage, which is not likely to ease much while the race for industrialization continues. Several months ago President Eisenhower turned down Khrushchev's request for long-term credits. And the only barter deals permitted are U.S. grain for Russian metal.

Most Russian trade will probably continue behind the Iron Curtain, as the U.S.S.R. and its satellites coordinate their chemical industry growth.

Chemical Uses Wanted

More glittering prospects now seem to be in store for producers of the "base metals," lead and zinc. One reason for the added luster is that more chemical applications for these metals are being developed under a new industry-wide research effort.

Particularly for zinc producers, there are signs of recovery from the doldrums of the past 12 months. Domestic shipments in August—according to data last week from American Zinc Institute—reached 68,718 tons, a new high for the year.

For the future, there are high hopes for new chemical and metallurgical applications being researched under the newly launched program sponsored by 19 lead and zinc companies *(CW Business Newsletter, Sept. 13)*. Director Schrade Radtke—whose chemical research career has included stints with Du Pont and Reynolds Metals—told *CW* that "several encouraging ideas" that would boost lead and zinc consumption "are already in the works."

Radtke, a 39-year-old chemist chosen from among some 350 candidates to head the program, singled out new chemical applications as a prime area for growth. He cites organometallics and catalysts as two industrial uses that can be vastly increased through research. Other chemically allied areas that Radtke will probe: fertilizer additives, insecticides and paints.

Researcher Radtke: A chemical future for lead and zinc?

At Lake George, 3 top men* of DCAT's top meeting of the year.

DCAT's Eye Is on Congress

A decidedly more active interest in national affairs—particularly industry-affecting federal legislation—will be No. 1 item in next year's program for the Drug, Chemical & Allied Trades section of the New York Board of Trade.

This policy was affirmed by members and incoming officers late last week at the DCAT annual meeting, held at the sprawling, venerable Sagamore Hotel on Lake George, about 65 miles north of Albany, N.Y.

Chairman-elect Ralph Clark, sales vice-president of J. T. Baker Co., reports that the executive committee has called for an immediate start on the 1958-59 program, which will include more emphasis on DCAT's "Operation Retort" *(CW, Feb. 11, '56, p. 33)* and a drive to increase "substantially" the section's present membership of nearly 800 companies. DCAT also will concern itself with the government's reclassification of chemical products in the U.S. tariff schedule.

Speaking Up for Industry: But the biggest change in the new program, Clark says, will be the greatly stepped-up interest in legislation affecting chemical and pharmaceutical firms.

He explained the three-fold plan to keep a closer watch on pending legislation this way:

- To report developments and interpretations through DCAT's bi-weekly publication for members.
- To confer with members on important bills.
- To express the organization's stands on major issues through letters to Congressional committee chairmen.

Assisting DCAT with its expanded legislative vigilance program will be Carson Frailey, a Washington attorney who specializes in CPI matters.

Business Optimism Prevails: Attendance at the three-day outing—more than 450, including delegates and their wives—was some 20% more than last year, which appeared to be a reflection of increasing confidence in the now-rising economy.

That optimism is on the upswing among industry executives was borne out in numerous informal conversations. The vice-president of one medium-size industrial chemical company said, "It's getting more and more difficult to complain."

*Left to right: Ashley Bladen, president, New York Board of Trade; Ralph Clark, chairman-elect, DCAT; and Boyd O'Connor, outgoing chairman, DCAT.

CW PHOTO—OSCAR

For ACS's industrial chemistry division, a jubilee toast.

'Chins-Up' Theme at Chicago

U. S. chemical companies are increasing their output and reactivating hitherto "stretched out or shelved" expansion and modernization programs. As a result, equipment companies are booking new orders at the fastest clip in more than a year.

Such was the theme of corridor conversations among industrial delegates to last week's 134th national meeting of the American Chemical Society, held in four big hotels in Chicago's "Loop" area.

Coinciding with the Windy City's first spell of crisp autumn weather this year, the ACS meeting brought in more than 12,000 chemists, engineers and educators—including three surprisingly unheralded visitors from Russia.

From Colloids to Jazz: In the five days that they swelled the Loop area crowds and bolstered business for the town's cabbies, the delegates found numerous ways to stay occupied. There were the 1,543 technical papers—on subjects ranging from colloid chemistry to marketing and economics—presented at sessions of the society's 22 divisions. There was the 10th National Chemical Exposition, sponsored by ACS's Chicago section, held in the International Amphitheatre and featuring more than 100 exhibitors. There were the jubilee birthday parties and symposia marking the 50th year for five ACS divisions.

But for delegates from industry, one of the biggest attractions of the meeting was the opportunity it afforded to mingle with colleagues from all parts of the country and exchange views. And the informal chatter of those concerned with the business world had a refreshing optimism. During a quick tour of the exposition displays, the chief executive of one leading Midwest chemical firm said: "If you use Ike's terminology and describe the recent business downturn as a saucer, I'd say we're well up the lip by now and heading for the side of the coffee cup."

Firming up these views was the way things were going at the ACS employment clearing house. Remarked a clearing house spokesman: "As far as technical talent is concerned, it looks as if it's becoming a sellers' market again."

Pigment Race Halted

What once seemed like a hot race between Du Pont and the Glidden Co. to build Mexico's first titanium dioxide plant (CW Business Newsletter, March 15) has finally ground to a complete halt.

To the dismay of local citizens looking ahead to new jobs and of government officials seeking to attract foreign capital, Du Pont has finally stopped construction of its $3.6-million titanium dioxide plant in Tampico. Glidden never even started building. (Glidden would actually hold a minority share of the plant, which would be built by its licensee, Industrias Quimicas Basicas de Mexico.

The reasons behind the stall lie in the complexities of dealing with a government that—like Mexico's—gets involved in industrial plans through regulations covering ownership and operations. And while the lame-duck government marks time until its successor takes over in December and is further distracted by strikes and riots, the bureaucratic wheels turn very slowly.

Glidden and its affiliate agreed with the government that Mexico presently has room for only one titanium dioxide plant, decided to hold off building a planned 8,000-tons/-year plant until Du Pont's course was clear.

Du Pont ran into its first snag when the government asked it to take on local capital in its proposed 5,400-tons/year venture. Du Pont agreed, offered to make Pigmentos de Mexico, S. A., a 20% partner.

But Pigmentos de Mexico could not get an answer from the government to its application for permission to form a joint subsidiary with Du Pont. Later, local Du Pont officials told *CW*, the Secretariat of Economy advised Du Pont it might have to take in 51% Mexican ownership when the new government came in. Du Pont again agreed, on the condition that it could charge licensing, name and know-how fees.

Work has finally halted, but the negotiations continue. If its plans finally fall through Du Pont could lose an estimated $2 million. Final action probably won't be taken until the new government steps in.

Glidden, meanwhile, is still on the sideline, watching and waiting.

AGAIN AVAILABLE!

POWELL

NICKEL and MONEL* VALVES

Fig. 2108—Monel or Nickel "Y" Valve for 150 pounds W.P. Outside screw rising stem and yoke. Screwed ends. Flanged end or socket welding end valves can be supplied.

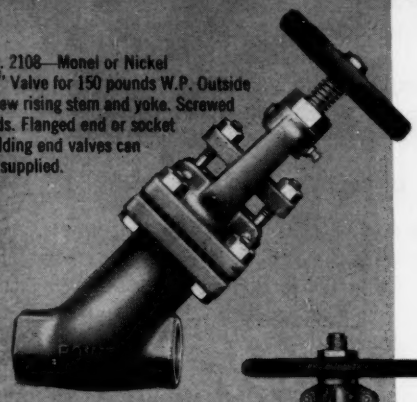


Fig. 2453 SG—Large size O.S. & Y. Gate Valve for 150 pounds W.P. Solid wedge disc. Can also be furnished with split wedge disc. Dimensions conform to latest standards.

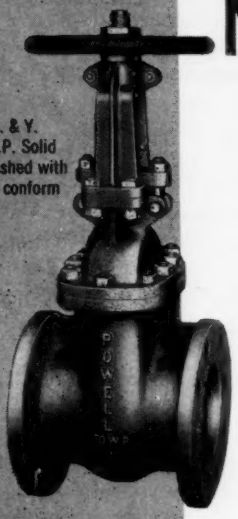
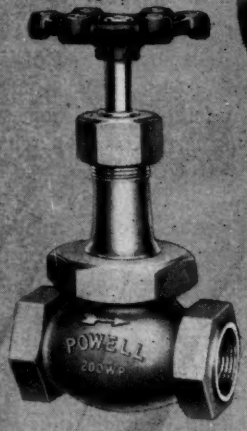


Fig. 1836—Monel Metal
Fig. 1839—Nickel
Small Union Bonnet Globe Valve for 200 pounds W.P. Available with screwed, flanged or welding ends; also in angle pattern.



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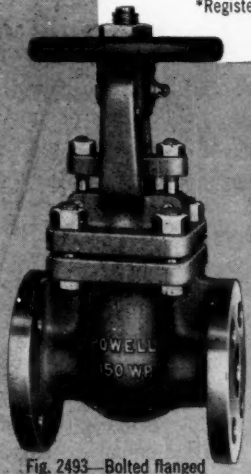
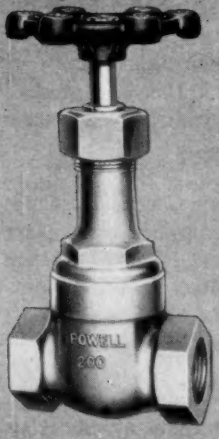
*Registered Trade Name of The International Nickel Co.

Fig. 1828—Monel Metal
Fig. 1830—Nickel Inside screw rising stem Gate Valve for 200 pounds W.P. Accurately guided solid wedge disc. Also available with flanged or socket weld ends.





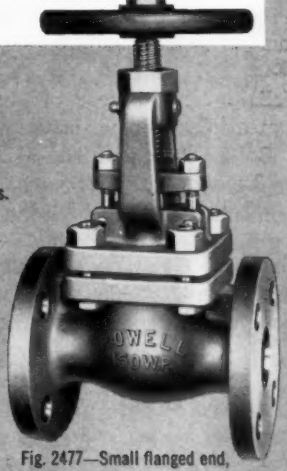


Fig. 1843—Monel Metal. Fig. 1845—Nickel. Small size Check Valve for 200 pounds W.P. Screwed-in cap. Has straightway flow area through valve body when disc is in wide open position. Can also be supplied with flanged or socket weld ends.

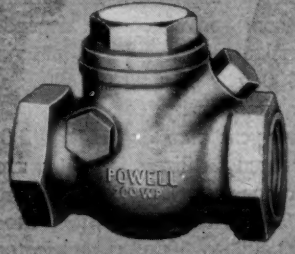


Fig. 2493—Bolted flanged bonnet Gate Valve for 150 pounds W.P. Outside screw stem rises through revolving bushing in upper yoke. Interchangeable solid or split wedge discs. Screwed or socket weld end valves also available.

Fig. 2477—Small flanged end, outside screw rising stem and yoke Globe Valve for 150 pounds W.P. Bolted flanged bonnet. Can be furnished with screwed or socket weld ends. Angle Valves available.

COMPANIES

Harshaw Chemical Co. (Cleveland) has filed a registration statement with Securities & Exchange Commission to make a public offering of $7 million worth of 20-year debentures. Proceeds will retire $3.5 million of debt and $1.5 million will go for capital improvements.

•

Reichhold Chemicals, Inc. (White Plains, N. Y.), had the best sales month in its history in August. The $6.75-million August sales volume is a 13% rise over the same month last year. The rise is accounted for, according to the company, by sales of newer products, including polyester and epoxy resins.

•

Atlas Powder Co. (Wilmington, Del.) will gradually close its White Haven, Pa., nitroglycerine explosives plant and consolidate its Eastern explosives production at the firm's Tamaqua, Pa., plant. The shutdown, to be completed by Dec. 1, follows a drop in use of nitroglycerine explosives in mining coal. The Tamaqua plant currently produces ammonium nitrate explosives.

•

Chemical Marketing & Mfg. Corp. (Chicago) is the new name, effective Sept. 1, of Chemical Marketing Corp. The firm will add manufacturing to its marketing functions in fields of plastics and protective coatings.

EXPANSION

Industrial Gases: Air Products, Inc. (Allentown, Pa.), is constructing a $2-million plant at New Johnsonville, Tenn. The company will sell liquid and gaseous oxygen and nitrogen to Du Pont for use in a new titanium dioxide plant due onstream in Jan. '59. The gas plant may later expand its mixed high- and low-pressure streams to include argon production.

•

Helium: U. S. Bureau of Mines will build its fifth helium extraction plant in the Keyes natural gas field near Boise City, Okla. The $12-million unit will process 70 million cu. ft. of natural gas daily to produce 200-290 million cu.ft. of helium annually.

•

Industrial Gases: Air Reduction Sales Co. (New York) will build a $600,000 plant in Denver to produce oxygen, nitrogen and liquid nitrogen. Completion date: Jan. '59.

•

Propylene Oxide: Wyandotte Chemicals Corp. (Wyandotte, Mich.) has put a propylene oxide plant onstream in Wyandotte (*CW, April 13, p. 17*). Using the chlorohydrin process, Wyandotte is also by-producing propylene dichloride and dichloroisopropyl ether for sale as well as for its own requirements.

•

Semiconductors: Beckman Instruments, Inc. (Los Angeles) has formed a subsidiary company, Shockley Transistor Corp., to develop and manufacture specialized semiconductor components for electronic control systems. The expansion will permit a 10-fold increase in production of the Shockley four-layer transistor diode, one of the principal developments in a two-year pilot program (*CW, Nov. 26, '55, p. 148*).

FOREIGN

Cellophane/Austria: Zellwolle Lenzing AG. will boost cellophane production from 3 tons/day to 8 tons/day within the next three years through installation of a new 5-tons/day machine to produce wide-sheet cellophane.

•

Pharmaceuticals/Germany: German pharmaceutical output and sales data for 1957 indicate that exports were up 30% from '56, imports 63% higher. Best customers: Austria, Venezuela, Switzerland.

•

Chemicals/Germany: The West German chemical industry showed a 4% rise in sales in first-half '58 over the same period last year. Sales totaled $2.08 billion. Plastics and petrochemicals growth are credited for the increase, although a textile industry slump has tended to retard growth. Chemical production has outstripped sales with a 7.5% rise; total industrial output rise is only 2%.

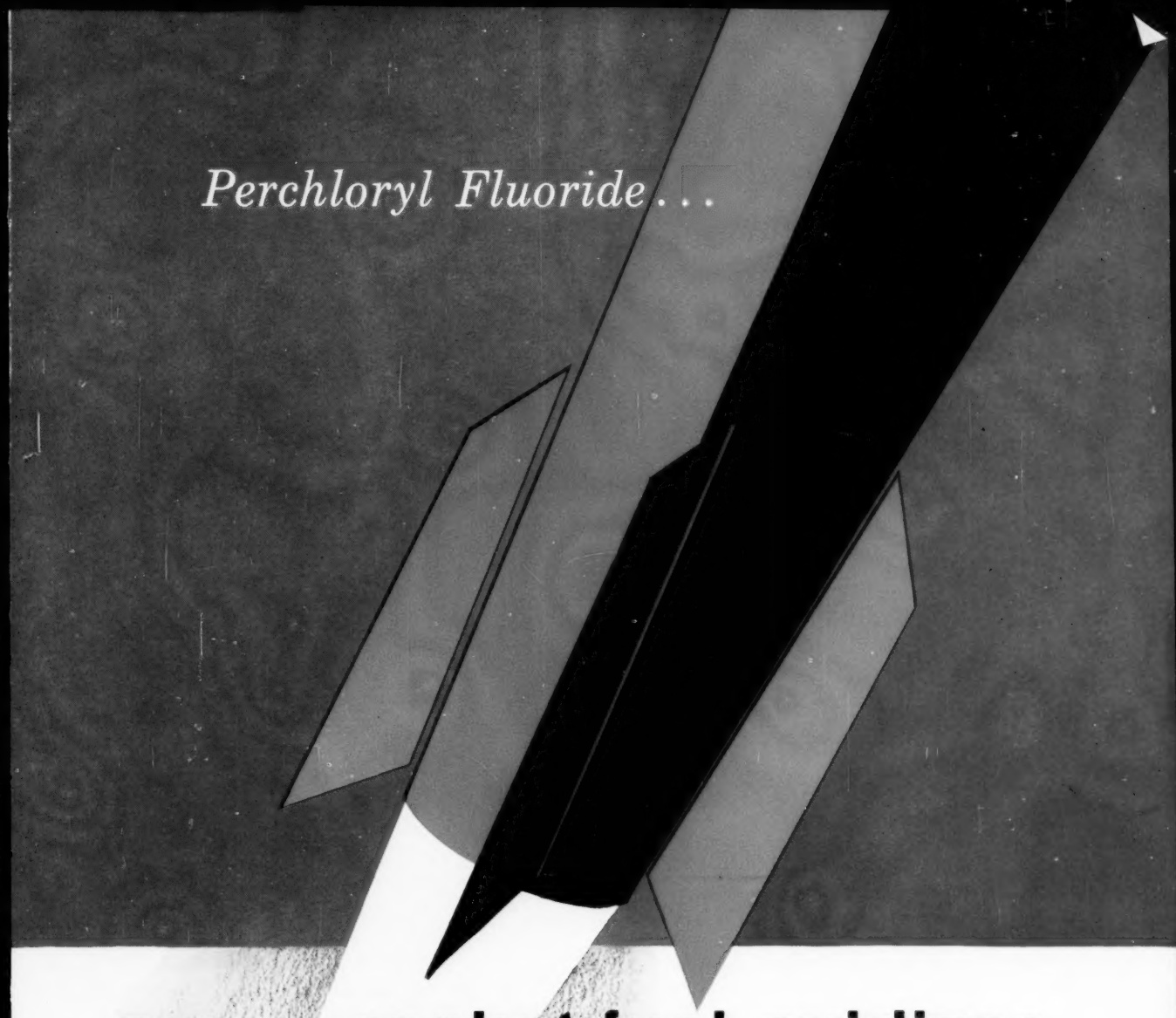
•

Caustic Soda/India: Two of seven proposed units are scheduled to go onstream in India by the end of '58; these are privately sponsored projects. India's output in '57 was 42,400 tons, considerably below domestic demand. Negotiations are being carried on for purchase of chemical equipment from Japan.

•

Chemicals/Iron Curtain: Russia and its satellites have planned increased emphasis in segments of the CPI in those nations. According to accounts in various publications of the Iron Curtain countries:

- Russia plans a 15-fold increase in production of industrial and domestic gas—150,000 million cu. meters/year by '65, 300,000 million by '72.
- The Poles have had startup troubles with urea production. Hoping to attain an annual rate of 20 million kg. in the fourth quarter of this year, they've found that their high-pressure process is not easy to tame.
- The Czech CPI have plans for large production increases, which they admit might be handicapped by slow delivery of equipment and which will depend to some extent on Russian know-how and raw materials. Among the goals: 95,000 tons of chemical fibers and 3 million tons of fuels annually by '65.
- Bulgaria's new four-year plan demands 330,000 metric tons/year of nitrogen fertilizers by '61 (current output: 122,000 metric tons/year), a hike in annual soda ash output, from 94,500 to 234,000 metric tons, and in sulfuric acid, 40,400 to 300,000 metric tons.



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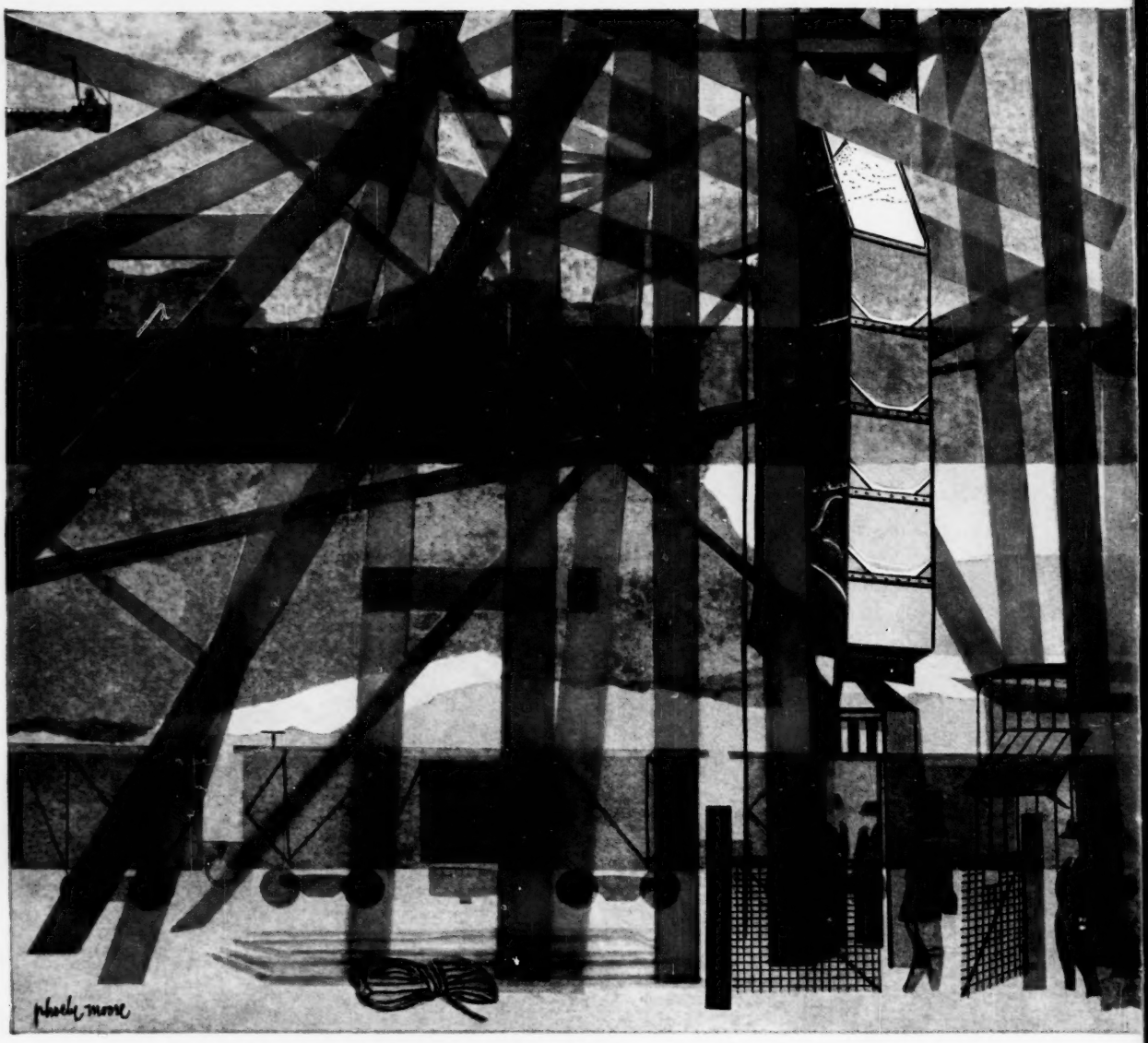

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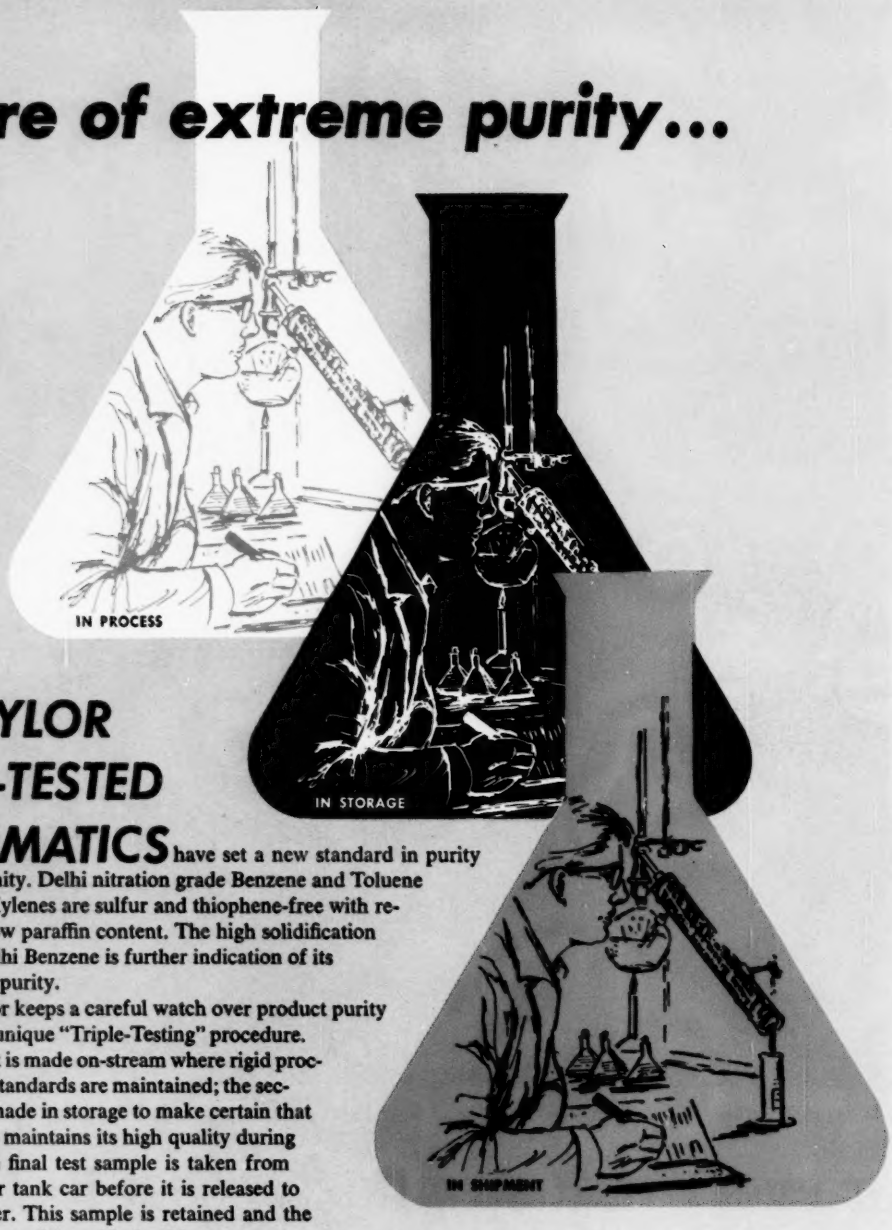

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Newsletter

CHEMICAL WEEK
September 20, 1958

Vice-President Nixon has made a pitch to the businessman that is really his first big overt move toward an open campaign for the Presidential nomination in 1960. That's what, primarily, lay behind Nixon's intriguing speech a week ago to alumni of the Harvard Business School.

In the first good insight into his own economic views, Nixon declares himself for, among other things, reducing the corporate income rate by a point or two, more liberal depreciation of plant and equipment, a general 1.5% manufacturer's excise tax in lieu of the present hodgepodge of excises, and some downward adjustments in the highest bracket rates on personal income. Nixon said he thinks these proposals should have "top priority" at the next session of Congress.

Nixon was speaking for himself, not the Administration. The most reliable sources within the Administration say that as of now there is absolutely no plan for Eisenhower to propose any tax overhaul next session that would result in a net decline in federal revenues.

This does not mean an Eisenhower-Nixon rift. There is no evidence that the Administration is either piqued at Nixon or embarrassed by his tax stand, although it's radically different from the Administration's.

•

Employment is trending up in the chemical process industries. Latest official government figures show employment gained in the chemical and allied products industries by 4,700 workers between July '58 and Aug. '58, the month for which figures have just become available. Other gains in August, compared with the prior month: stone, clay and glass industries, up 8,700; rubber products, up 5,100; petroleum and coal, virtually unchanged. Over-all, however, the figures for August show employment was still down by about 100,000 from the comparable month of '57.

•

Imports of crude oil into the U.S. east of the Rocky Mountains will gain slightly in '59 under a new voluntary plan proposed by the government. New goals are 750,000 bbls./day of crude oil and 75,000 bbls./day of unfinished oils. The figure for unfinished oils represents about a 50% cut from current allocations. The new plan will take effect Jan. 1 if industry's comments on it are favorable.

•

Note the shifts in defense contractors in the latest list from the Pentagon covering 100 largest in calendar year 1957.

Among the chemical companies higher on the list is Thiokol, rated as 71st in dollar volume of prime contract awards last year; its orders totaled $33.5 million for the 12 months. For the 30 months from Jan. '55 through June '57, the previous compilation of Thiokol's orders placed it 93rd, with $58.5 million.

Olin Mathieson is 48th in the latest listing, with $50.8 million; in the earlier list, it was 47th with $129.4 million.

Du Pont was not among the 100 largest last year; but for the earlier period, it rated 82nd, with orders of $67.7 million.

Food Machinery and Chemical rated 86th, with $25.2 million; on the last list, it was 65th, with $79.2 million.

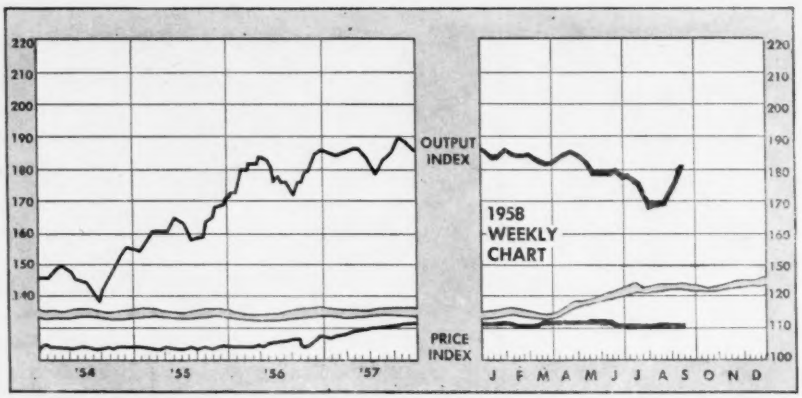
Eastman Kodak 70th on the list, with $33.7 million; in the earlier list, it was 62nd, with $87.3 million.

U.S. Rubber was also not in the top 100 this time; last list showed the firm in 63rd place with $85.8 million.

•

More money to support the new federal program to build science, math, and foreign language courses in primary and secondary schools will be asked of Congress in January. Arthur Flemming, Secretary of Health, Education & Welfare, told a news conference last week that the $40-million total that Congress voted for the aid-to-education program will barely get it started.

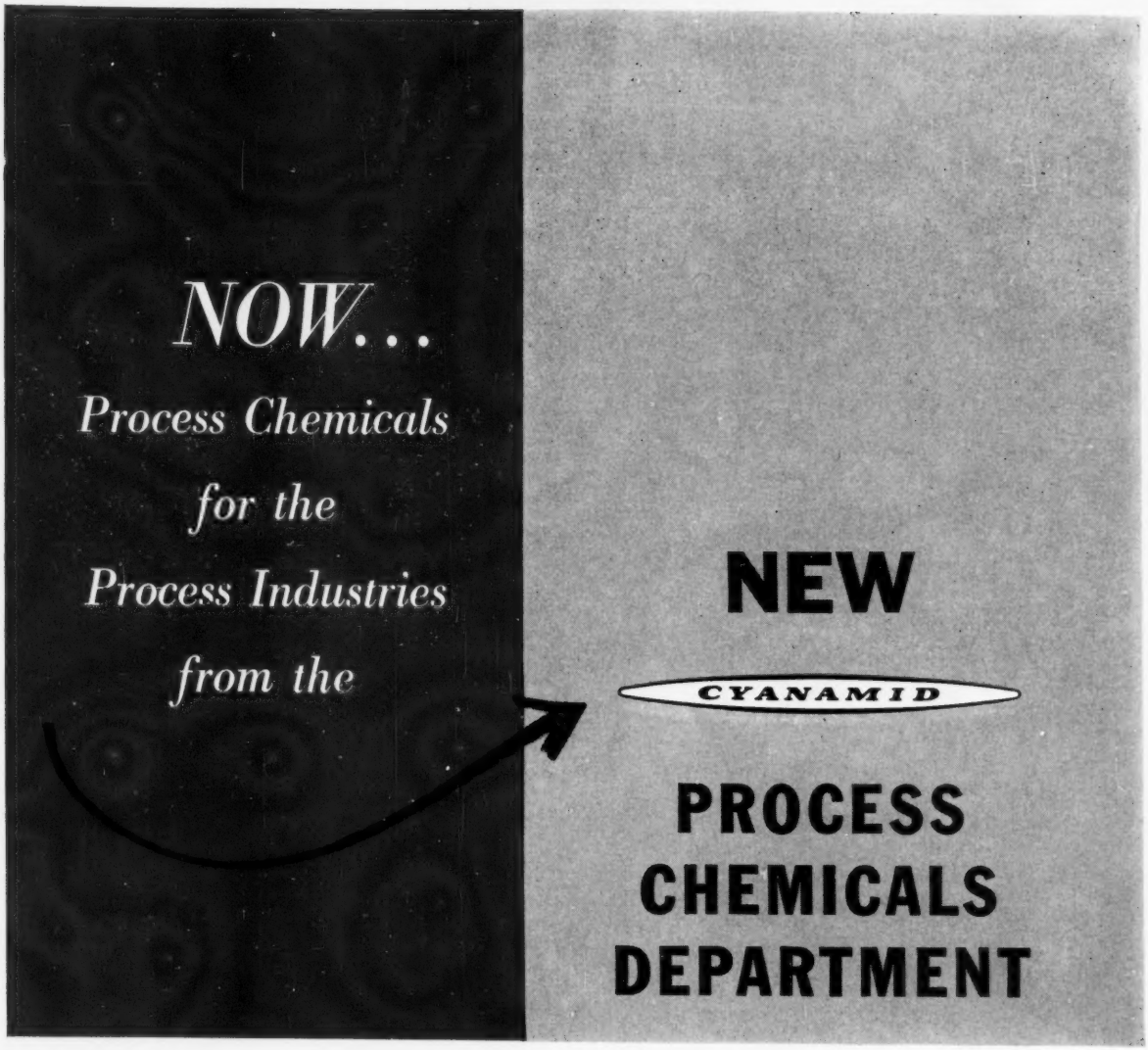
Nineteen million dollars is available now for equipment and remodeling of science departments in precollege schools. This should equip perhaps 3,000 high schools with general science laboratories, figuring $6,000 as the estimated average cost of a typical high school layout.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	181.0	182.0	182.5
Chemical Week wholesale price index (1947=100)	110.6	110.7	110.9
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	45.10	44.73	41.92

MONTHLY	Exports			Imports		
Foreign Trade (million dollars)	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	113.3	127.9	112.5	20.3	24.4	21.4
Coal-tar products	6.8	8.1	6.1	4.5	6.5	5.0
Industrial chemicals	16.7	20.6	15.9	7.2	7.2	6.9



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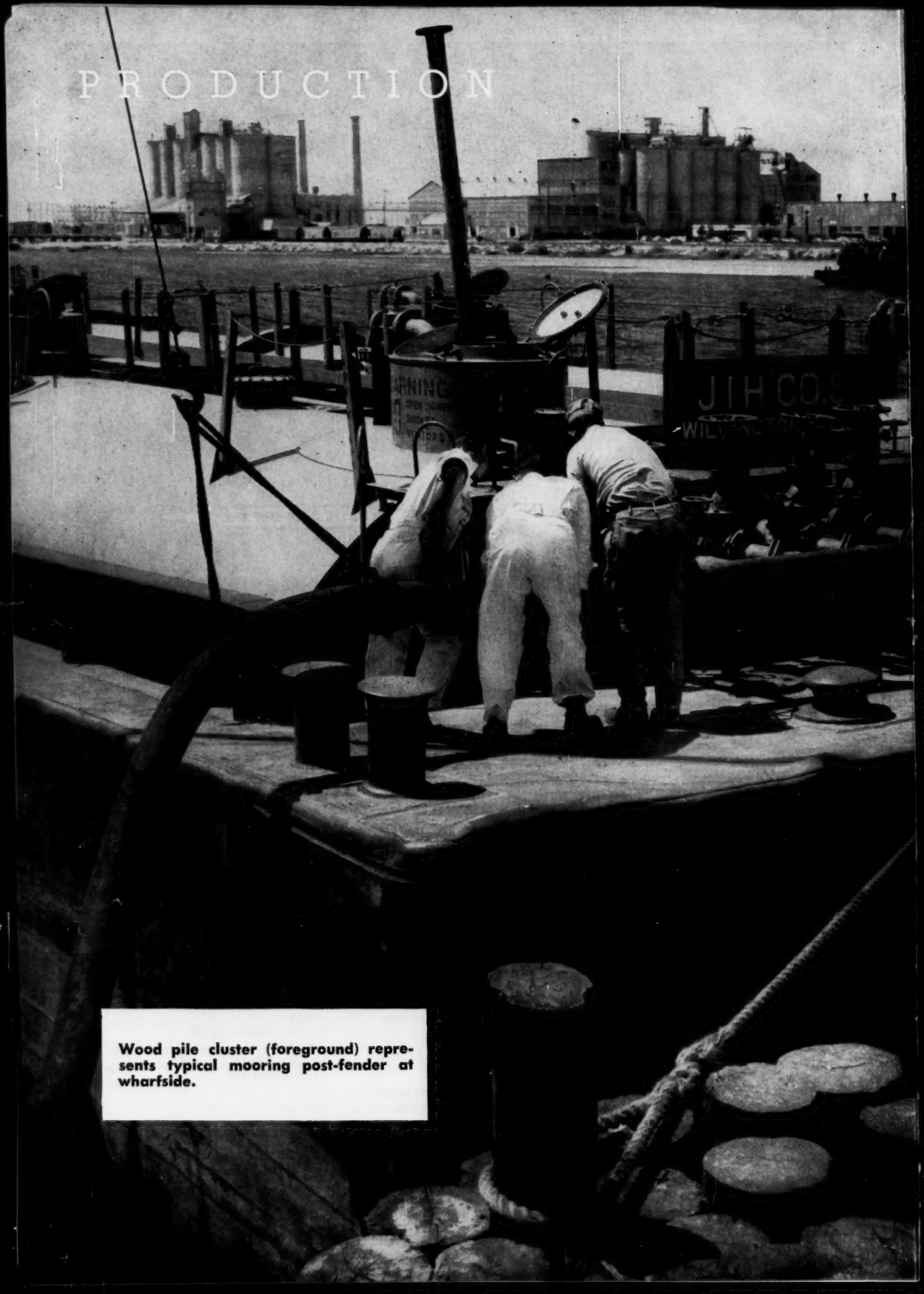


Wood pile cluster (foreground) represents typical mooring post-fender at wharfside.

Get More For Your Waterfront Dollar

More than 100 companies, including many chemical process firms, this week are in the midst of new construction or expansion of facilities along navigable waterways. Pointing up the growing trend to water transportation, this activity underscores the need for management to know how to get the most for its dollar invested in the waterfront.

The waterfront might be one of the costliest areas of plant development—so costly that ship loading and unloading installations are prohibitive for chemical plants. Or, cost might be so small that a chemical plant shouldn't be without water shipping facilities.

Once economical docking facilities have been provided, chemical companies can turn the area into one of rewarding profits. For example, Monsanto, in its annual report, points out that "to compensate for a succession of rail-freight rate increases, we are taking advantage of our plant locations to increase the waterborne movement of raw materials into our plants and movement of our products to other plants or customers."

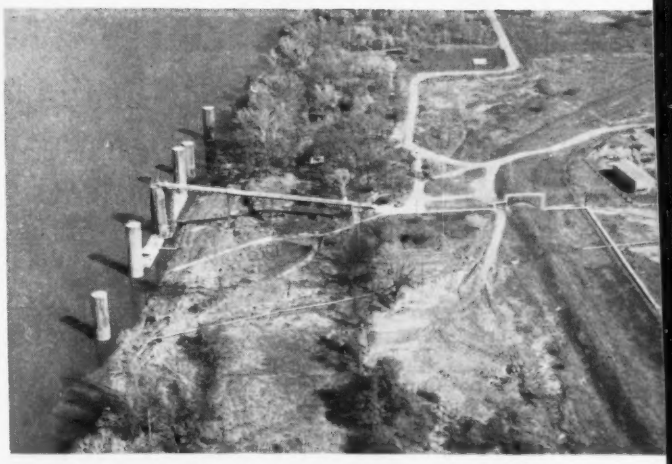
Union Carbide, too, is a company whose long-range planning includes a "must" for locating future (next 10-15 years) large plants on navigable waterways. In both these cases, transportation economies are possible only if economical docking facilities are made.

Only a Bridge: William Kinneman, chief civil engineer of Raymond International, Inc. (New York), points up this basic factor to keep in mind when building water shipping installations: "Wharves are the bridges between the ships and the land. Just as you don't park cars on New York's George Washington Bridge, you don't store goods on wharves and piers any longer than necessary."

This philosophy, if strictly adhered to, will result in the simplest, most economical type of wharf, Kinneman says. Too many piers, he adds, are used as storage areas—the most expensive storage areas available. Kinneman estimates pier construction cost at between $10 (seldom reached) and $50/sq. ft. Construction of a warehouse elsewhere might cost about half of the lowest cost of building a pier.

As an example of optimum construction, Kinneman cites a Gulf Coast pier for loading phosphate rock. It is merely a conveyor belt set on pilings running from shore to a deepwater dock area. A 5-ft.-wide catwalk alongside allows conveyor maintenance and the handling of a ship's lines.

Wyandotte Chemical, for its new tanker- and barge-loading facilities at Geismar, La., came up with a



Stauffer's Louisville dock—steel piles for mooring barges. Pipeline to the plant (right).

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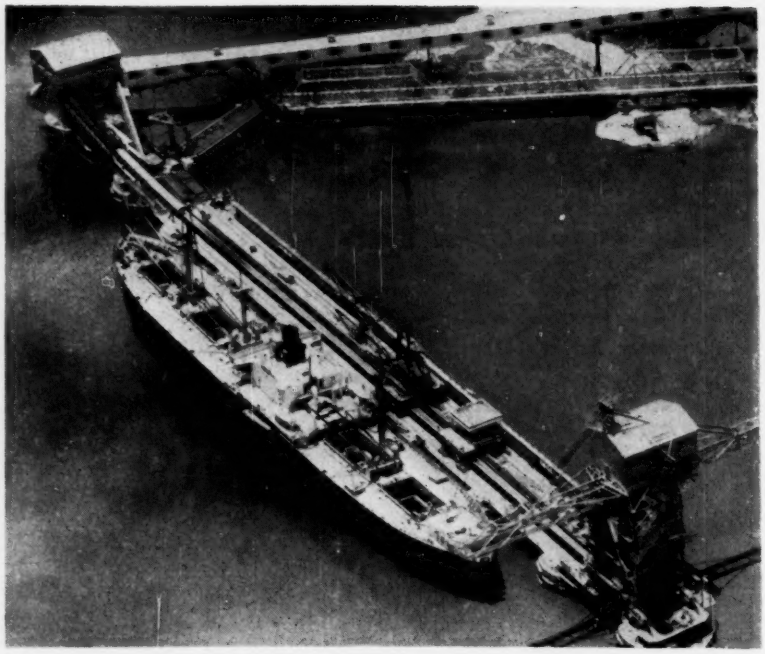
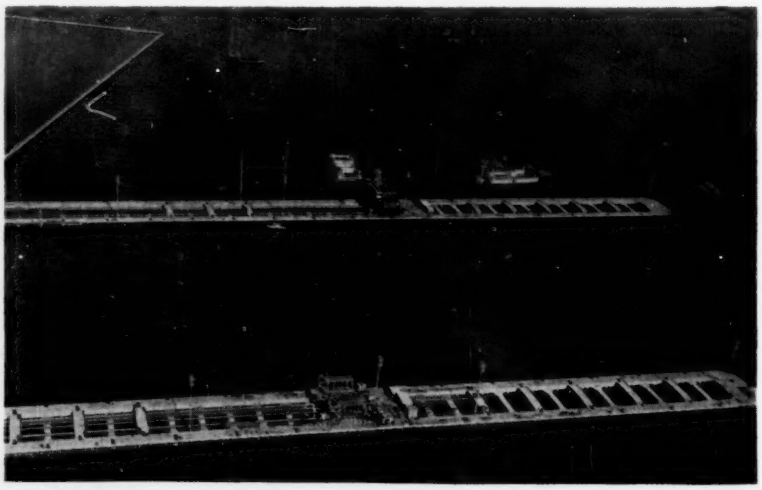


Bucket crane and conveyor speed unloading of bulk alumina.

similar, simple installation. Six steel towers — four small and one large —connected by narrow elevated walkways, form a 600-ft.-long mooring that runs parallel to the shore of the Mississippi River. A pipe bridge connects the structure with the shore, carries products from plant to ship.

River facilities for docking barges only can be simpler — a barge can sometimes be tied up directly to the shore without any wharf, or to another barge used as a wharf, or to dolphins (mooring posts) that double as loading platforms.

Rivers Cheaper: In general, construction of docking facilities on inland waterways is considerably cheaper than building them on or near the seacoast. A plant on a coastal waterway would probably build docking facilities for an oceangoing ship of 4,000 tons minimum, might also want facilities for a T-2 tanker of 16,000-18,000 tons. On an inland waterway, a plant would build docks for only



Concrete piers have open center areas for pipelines to save cost.

500-2,500-ton barges. Under the most ideal conditions, the simplest facility for oceangoing ships would seldom cost less than $100,000; the simplest inland-waterway facility for a single barge might cost no more than $20,000-$25,000.

However, conditions are seldom ideal. Here are the major factors that might add to cost, and some tips that could mean savings:

Location: Careful choice of location — once the general area has been selected—saves on both the cost of original construction and the maintenance. Weather, tides and currents are of prime concern. The U.S. Dept. of Commerce's Coast and Geodetic Survey Bureau, the U.S. Army Corps of Engineers and consultants and construction firms provide information about rivers and harbors.

The best locations are those sheltered from the weather. Wharfs must be oriented so that ships can dock "into" the prevailing winds. Sometimes, icebreakers must be sunk upstream to protect the inland docks. On the Great Lakes, of course, the shipping season is limited by the winter freezeup.

If shelter from weather and rough water is insufficient, a breakwater may have to be provided; however, a breakwater may reduce dredging costs through the years. And, dredging might be the largest single item of landing facility expense. The Corps of Engineers is charged with channel dredging, sets bulkhead and pierhead lines. Savings on dredging costs are possible where the channel is closest to the pierhead line.

Dredging costs vary considerably, are usually between 10¢ and $2/cu. yd., depending on the type of material moved (rock is most expensive; sand is cheapest), labor cost, and ease of waste disposal. Sometimes the dredged material may be used as fill to reclaim land behind the bulkhead line. But often in coastal areas, the cost of reclaiming waterfront land is prohibitive. And on inland waterways, the Corps of Engineers requires dredged material to be moved beyond river high-water level.

Permission to dredge must be obtained from the state and the Corps of Engineers. Riparian rights legally belong to the states. Some states don't exercise their rights, but rights often must be purchased from states

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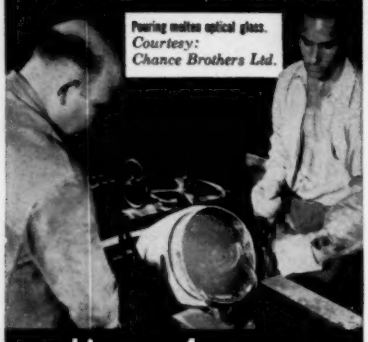

Pouring molten optical glass. *Courtesy: Chance Brothers Ltd.*

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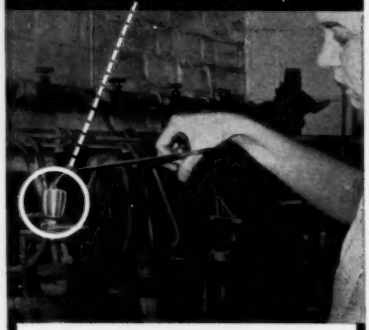

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by companies that want to obtain water access to land.

Land may be undermined by dredging unless it is properly protected. For example, Celanese, at its Port Newark terminal, protected a neighboring property with an interlocked steel-sheet bulkhead (approximate cost: $300/ft.).

Dock Construction: Depth of water, load to be supported and the type of land below water level are prime factors in the cost of a wharf. Wood construction is often sufficient for harbor and river, particularly when light materials and piped liquids are being handled. For example, top-quality Douglas fir and southern yellow pine piles commonly carry loads of 20 tons, while concrete piles go much higher (size is generally based on loads of 500 psi.).

Wood, which has the advantage of lower initial cost, is more expensive to maintain than are steel or concrete constructions. However, if the facility is properly built and if the wood is protected against marine borers, it should have a service life of at least 20 years and require no maintenance for the first five years, according to Peter Gannon, chief of New Jersey's Bureau of Navigation.

Concrete — by far the most expensive, in practice — has an indefinite life. Steel, in fresh water, is practically maintenance-free and, according to engineers at Dravo Corp. (Pittsburgh), dock facilities 28-29 years in service have not shown deterioration. In salt water, steel must be protected — usually cathodically. But if the provisions are made for cathodic protection during the construction stage, actual installation of the complete cathodic system may be made later.

While steel and concrete wharfs are fireproof, wood requires planned protection. For example, Celanese installed at Port Newark a sprinkler system beneath its wooden pier—the most difficult area in which to fight a fire, says Bill Schnabel, director of operations control.

Furthermore, wood is not strong enough to be used for construction in deep water. Engineers at Fredrick R. Harris (New York), for example, would not consider a wood bulkhead in over 20 ft. of water, suggest instead interlocked steel-sheet piling. And while many river docks need only 9-12-ft. depths to accommodate barges, steel pilings are often used because of the tremendous difference between high and low water levels.

For example, Dravo has built several dock facilities using interlocked cellular steel-sheet piles in the Louisville area, where there is a difference of 70 ft. between high and low water.

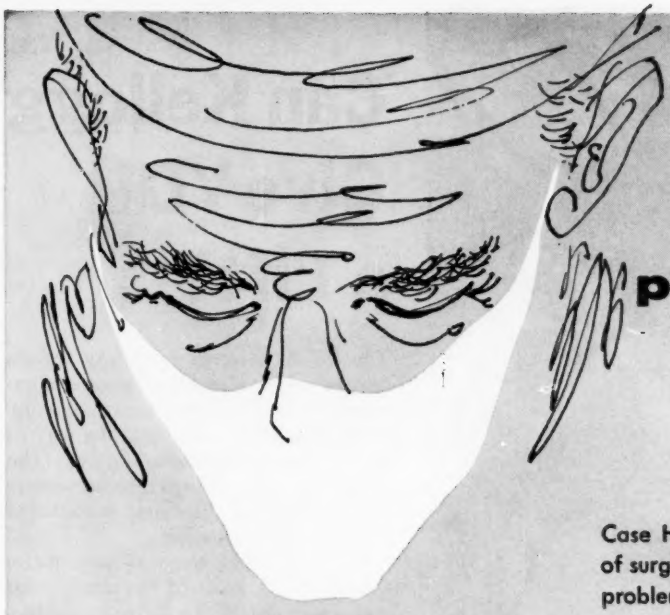
Materials-Handling Costs High: The investments made in wharf construction are often more than matched in materials-handling equipment. For example, Dick Hosey, assistant manager at Celanese's Port Newark terminal, estimates that its stainless steel lines to handle seven chemicals cost about twice as much as the pier.

Generally, materials-handling costs at beginning and end of trips total about 20% of the transportation cost, according to John Carlson, Stauffer's director of transportation. Handling bulk solids is the most costly, particularly unloading — it is easier to load material into a ship's hold than to take it out. But companies find ways around this. Monsanto, for example, ships sulfur in molten, rather than solid, form from the Gulf Coast to Everett, Mass. Carbide reports that plastics may be unloaded by filling the hold with water, pumping the contents out and draining off water.

Handling liquids is simplest. In fact, underwater pipelines may be run out to deepwater buoys where a ship may be moored — completely eliminating the need for a wharf (although this system seldom can be used in rough weather). But dock booms are often helpful, sometimes necessary, for the speedy handling of heavy hoses. Celanese, for example, says it must connect seven hoses for simultaneous unloading of products, couldn't perform the job satisfactorily without the use of an air-operated dock boom at Port Newark.

Justification: Inexpensive wharf facilities for handling a few barge loads of material at a time can often be justified at inland-waterway locations. But as many firms point out, large-volume movement is usually the only justification for water transportation of products.

If the volume is there and if water transportation cost is only about one-third the rail cost (according to Carbide's rule-of-thumb), the water route can prove to be a savings route for chemical makers.



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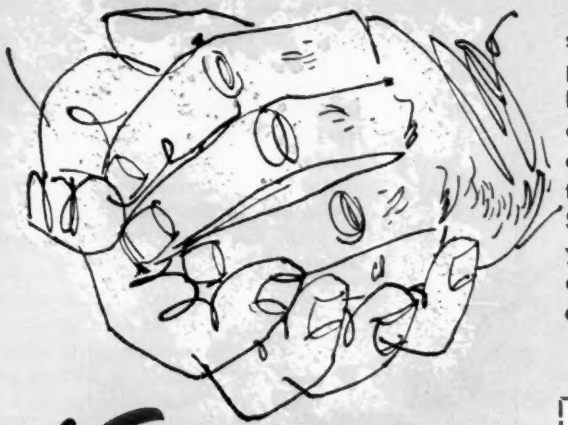

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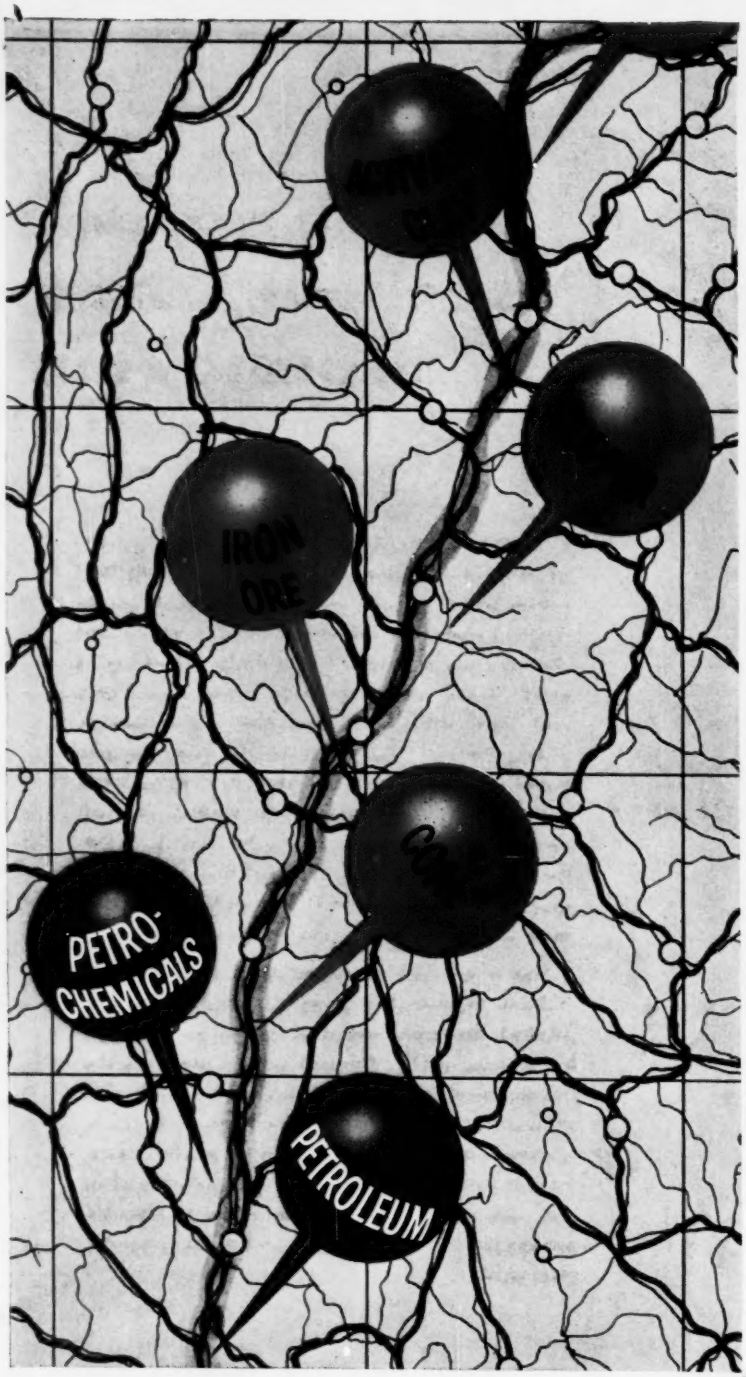

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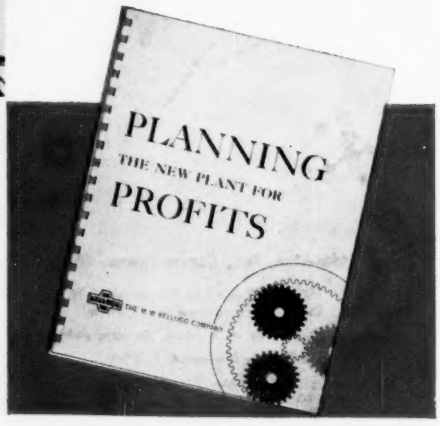

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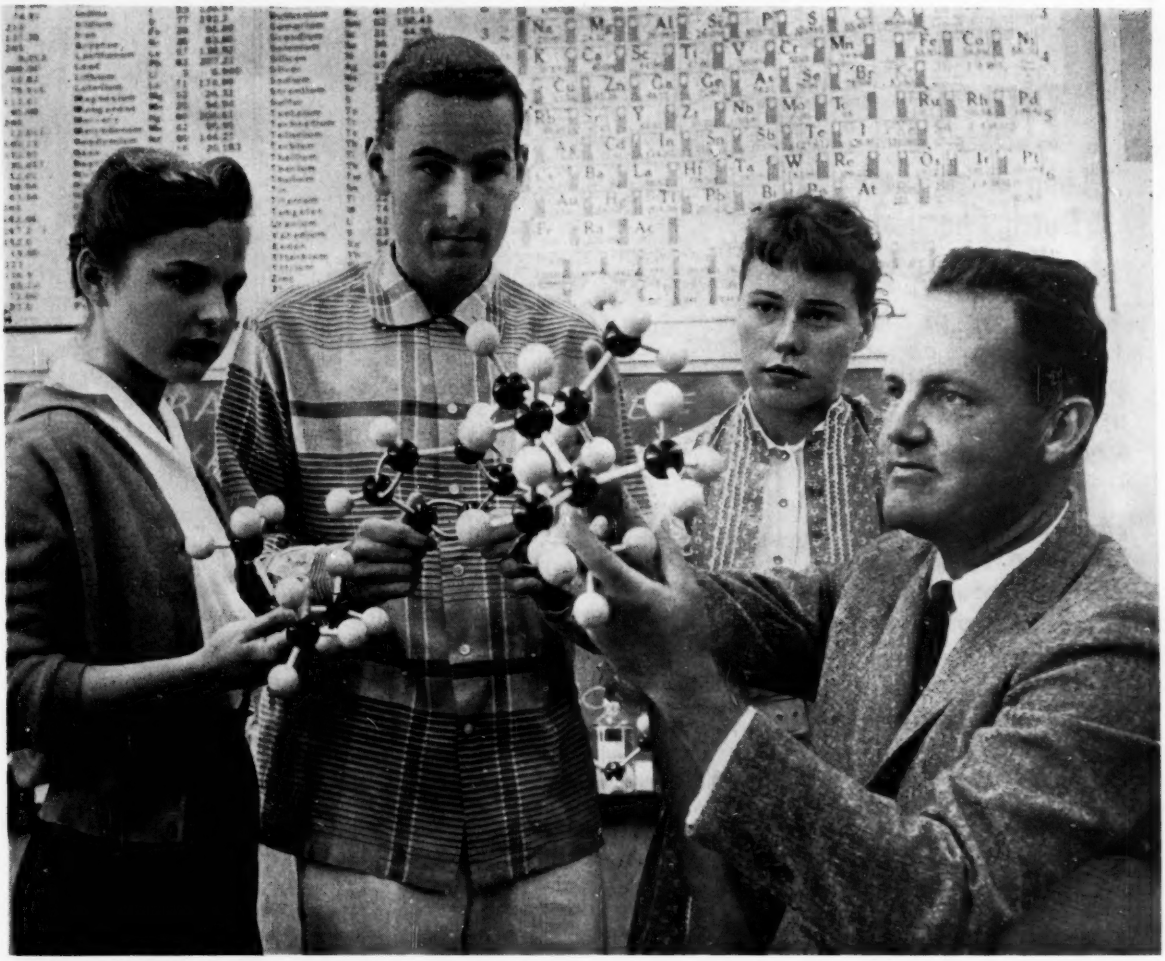

Engineer Bill Malseed, one of 22 Shell scientists lecturing regularly to Los Angeles students.

Showing Industry's Stake in Education

Los Angeles area school reopenings this month are resulting in a lot of additional work for some 22 chemists and chemical engineers at Shell Chemical Corp.'s synthetic rubber plant at Torrance, but the scientists, all volunteers, don't mind. They're cooperating in a nine-company industry education program to encourage students toward scientific careers.

The program reached effective proportions during the last spring semester when 20 teams composed of 77 chemists, engineers and mathematicians from nine companies gave demonstration-type scientific lectures in 18 schools.

By industry's incorporating professional scientists into the curricula of the city schools, students in 102 classes have had 12,240 student-hours of classroom contact with industrial specialists.

Shell's scientists are on hand to present specific sections of regularly scheduled chemistry courses.

Shell, which last semester provided 22 lecturers comprising four teams from its Torrance plant, and Hughes Aircraft, whose scientists first promoted the program through the Los Angeles Technical Society's council, are the two most active firms participating in the program. Last semester, for example, Shell employees gave 3,400 student-hours of instruction at seven schools, 28% of the total instruction given in the program. Also participating is Shell Oil Co., parent company of Shell Chemical.

Three Main Objectives: The Los Angeles program has three major objectives: to motivate students to study science and mathematics, to modernize teaching methods and materials and to improve the guidance of pupils through realistic contact with science and industry in professionally conducted classroom sessions.

Only four of the schools visited by Torrance scientists are part of the Los Angeles industry education program. Three other schools, located near the plant, asked Torrance management di-

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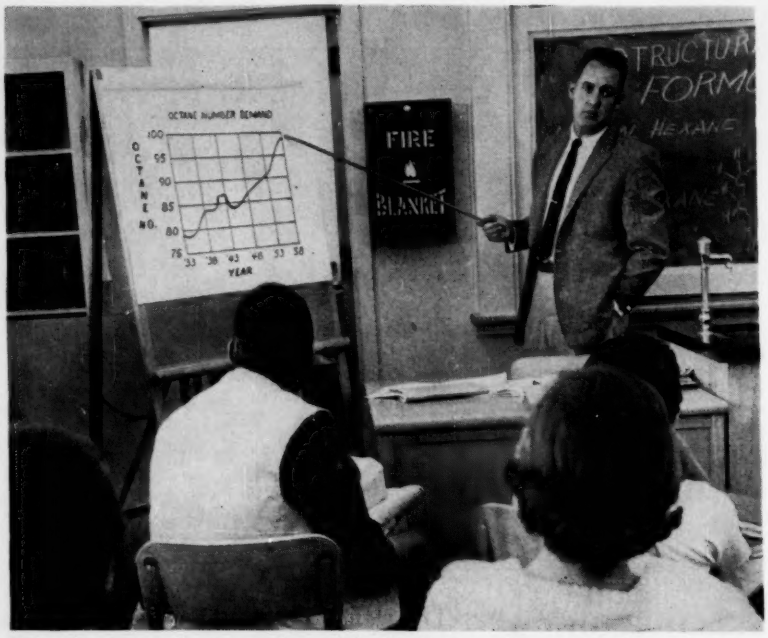


Scientists use charts and models in lecture demonstrations.

rectly to be included in the lecture schedule of the company's teams.

The participating Torrance scientists are generally young chemists, group leaders and assistant managers. No formal guidance has been provided for those who have not taught before. However, William Malseed, an engineer from Shell Oil's Wilmington, Calif., refinery, briefed some of the lecturers last spring, drawing on experience gained in similar lectures.

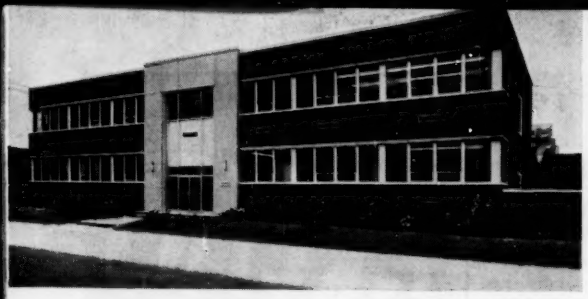
Lecture Topics Selected: Last semester, the Torrance lecturers presented four topics to each chemistry class in each school on the company's schedule, fully adapting the techniques of demonstration-type lectures. The first lecture was an introductory discussion of "chemistry in industry." A portable gas chromatograph and pH meter were used for the second lecture on "the industrial laboratory." The third lecture, "Hydrocarbons," incorporated flannel-board charts and molecular models to illustrate key points. The coagulation of latex and a showing of the various types of rubber and plastics highlighted the final lecture, "Polymers."

While it's too early to evaluate the effectiveness of the program, students and teachers alike have received the lecturers enthusiastically and students have displayed a genuine interest in learning about the daily activities of scientists working in industry.

Industry reaction to the program was expressed by Maarten Voogd, manager of Shell Chemical's Torrance plant: "I've always felt that the teaching of science was too abstract, too mysterious. I feel that the student should be able to see what science means." He added that the Shell Companies Foundation strives to provide encouragement to students and teachers of science through research grants, graduate fellowships and summer seminars for science and math teachers. In addition, it has encouraged its employees on the local level to assist schools whenever possible and to participate in industry education programs where appropriate."

Voogd concluded that industry hasn't been playing its role: "We should have been in a program of this sort 20 years ago. Industry should not sit back and wait for the schools to call on it for help."

Says David Randolph, full-time coordinator for the Los Angeles industry education program, "Shell has not been one to sit back." He praised the company for the way it has set the pace in organizing its lecture schedules, described the company's efforts as the most ambitious within the framework of the program.



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Benzyl Alcohol Tech.
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p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzyl Cyanide
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Dicyclohexyl Ketone
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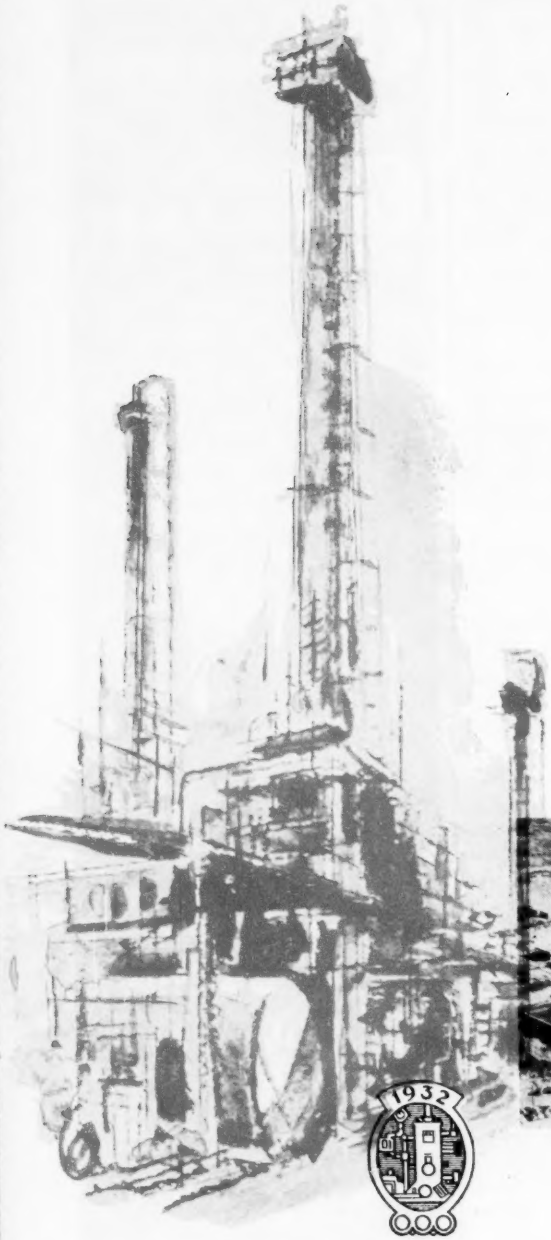
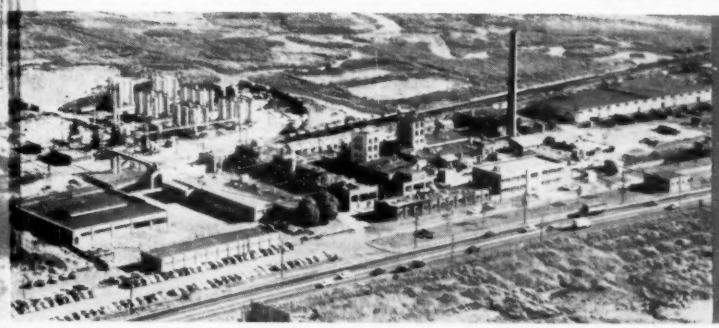
Methyl Heptenone
Methyl Phenylacetate
Phenylacetic Acid
Phenylacetone
Phenyl Propyl Alcohol
Potassium Phenylacetate
Propiophenone
Sodium Phenylacetate
n-Valeric Acid
And Other Intermediates





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ADMINISTRATION

Joining EEC Market

European "common market" tariff regulations will force U.S. manufacturers of pharmaceuticals, cosmetics and similar items to turn out finished products within the common-market area if they wish to sell profitably in Europe. This is the conclusion of Antonie Knoppers, president of Merck Sharp & Dohme International, as expressed in a new book* on the common market and its significance for U.S. business.

Knoppers' remarks on his company's experiences in the six-nation common market, officially designated as the European Economic Community, are included, along with comments by other top U.S. businessmen, in a chapter on the "Challenge to American Company Planners." This chapter, as is most of the book, is based on material presented last February at a special AMA conference on the common market.

Knoppers concludes his remarks on European Economic Community by saying that it seems clear to Merck that EEC will mean tariff walls for finished goods, moderate tariffs for semifinished goods and essentially free trade for raw materials: "In our business—and this can be extrapolated for similar enterprises, as in foods, cosmetics and many types of machinery —an advanced stage of basic production is therefore necessary." He points out that Merck's decision to "go basic" in Europe has already paid off, and cites the vast possibilities of the EEC buying power.

The liberally illustrated and indexed book, edited by Elizabeth Marting, is one of the first to analyze the common market from the viewpoint of the U.S. manager. It shows how EEC was conceived and planned, how it will affect many aspects of U.S. business, what to expect in the way of major restrictions and obstacles, how U.S. industry may gain acceptance in the market and how it may profitably plan new products for the market.

An indication of the future significance of the common market to U.S. businessmen is found in the book's foreword by Walter Hallstein, president, Commission of the European Economic Community: "The Ameri-

*"The European Common Market: New Frontier for American Business," American Management Assn., 220 pp., $6 (AMA members: $4).

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For more information on Readco processing equipment for the chemical industry, see Chemical Engineering Catalog, pages 1567 to 1574D.

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can businessman will soon realize that Europe by no means expects to be economically self-sufficient . . . American firms . . . will find a broader market, a greater sales opportunity opening up—under the same terms that govern all European concerns." He adds that "we can count on American capital's being needed more than ever as European industry is forced to expand."

The book with its comments by U.S. management steeped in experience in European commerce, could be particularly useful to export-minded executives.

LEGAL

Pollution Ordinance Offered: A public hearing on a proposed air pollution ordinance has been set for Oct. 1 in Columbia, S.C. The bill has been submitted for city council consideration by the Columbia Chamber of Commerce.

Designed to broaden the city's present smoke abatement ordinance, the measure specifies that regulations now covering output of smoke and soot from fuel-burning equipment be extended to include dust, gases, fumes, odors and other injurious or offensive materials.

The proposal, anticipating further industrialization of the Greater Columbia area, was endorsed by the Columbia Coal Dealers Assn., Junior Chamber of Commerce and several women's organizations.

•

Lilly Antitrust Suit: Sirbel Sales Corp. (New York) has filed a $300,000 treble damage suit against Eli Lilly & Co. (Indianapolis, Ind.), charging violation of the Sherman Antitrust Act. The suit, filed in federal district court in New York, charges that, since '40, Lilly had entered into enforced contracts and unreasonable restraints of trade in the distribution of its products.

Sirbel, a retail and wholesale drugstore, alleges that Lilly and its wholesale and retail distributors had fixed resale prices and that Lilly boycotted and refused to sell its drugs to those dealers who failed to observe established prices. Sirbel claims it has been unable to purchase Lilly products.

Lilly answers that it was enforcing the "fair trade" laws legally, has asked that the suit be dismissed. Lilly offi-

cials told *CW* that the treble damage suit was, in effect, a countersuit in response to the fair-trade suit Lilly filed recently, charging Sirbel with violation of the New York State fair-trade act. There has been no decision in that suit.

LABOR

Varcum Chemical Strike Ends: Varcum Chemical Corp. (Niagara Falls, N.Y.) has resumed operations following an agreement in contract negotiations with Local 15-209, Oil, Chemical & Atomic Workers (AFL-CIO). The "package" reportedly totaled slightly over 16¢/hour.

The old contract had expired at midnight Aug. 31; and since no contract had been signed by then, the plant was struck.

The just-signed settlement calls for three weeks' vacation after 10 years, one additional paid holiday (the Friday after Thanksgiving), and eight hours' pay for holidays—including last Labor Day, which occurred while the men were on strike.

The company will provide expanded Blue Shield coverage and will pay for the proposed increase in Blue Cross rates effective Oct. 1.

The new contract also calls for a general 8¢/hour wage increase and adjustments on all but two job classifications, the adjustments ranging from 3 to 11¢ hour.

The new contract is for two years, expiring Aug. 31, '60, with a wage reopener in one year.

•

Unionization at Belle Works: Harry L. Drenner, district director of OCAW, has petitioned National Labor Relations Board to set a date for a unionization election at Du Pont's Belle, W. Va., Works. OCAW has tried unsuccessfully several times in the past to unionize the plant.

Drenner wrote Belle Manager Fred Otto that "the majority of employees have joined." About 1,900 of the plant's workers are eligible for union membership. Election probably will be set for the first week in October.

•

National Aniline Recalls: National Aniline Division of Allied Chemical Corp. (Buffalo, N.Y.) is beginning to recall workers after recent drastic cutbacks in production and employment.

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Finally a LIGHTNIN Mixer representative explained how this company could easily mix uniform clay suspensions in its tall tanks—with a *side entering* LIGHTNIN Mixer like the one you see here.

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He can help you avoid engineering headaches, too, because his recommendations are based on unique MIXCO pilot-run data guaranteed accurate.

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ADMINISTRATION

about 60 workers have been recalled in recent weeks. He described the plant, whose fortunes are tied closely to the textile industry, as "getting back into good condition."

KEY CHANGES

Walter E. Remmers to president, **Luther W. Cashdollar** to vice-president and **Andrew H. Phelps** and **Lucien H. Mercier** to directors, Pittsburgh Metallurgical Co. (New York).

Charles F. Burroughs, Jr., to president, F. S. Royster Guano Co. (Norfolk, Va.).

George W. Hutchinson to president, **F. O. Burns** to executive vice-president and general manager, **H. S. Goldberg** to secretary-treasurer and assistant general manager and **Virgil M. Payne, Jr.,** to director, First Texas Chemical Manufacturing Co. (Dallas).

Arthur W. Vanaman to assistant to the president, Aerojet-General Corp.

Robert W. Kuntz to vice-president, Prior Chemical Corp. (New York).

Robert Steinbruch to manager of contract research, Minerals & Chemicals Corp. of America (Menlo Park, N.J.).

L. L. Baseler to director of administration, Overseas Division, Monsanto Chemical Co. (St. Louis, Mo.).

Edwin E. Tuttle to controller, Pennsalt Chemicals Corp. (Philadelphia).

Howard J. Grady to executive vice-president and director, California Spray-Chemical Corp. (Richmond, Calif.).

Robert S. Miner, Jr., to manager, Chemical Manufacturing Division, Ciba Pharmaceutical Products (Summit, N.J.).

Paul E. Hill and **Harold J. Michel** to vice-presidents, American Viscose Corp. (Philadelphia).

A. Eugene Schubert to general manager, Chemical Materials Dept.; **Sam L. Brous** to division marketing manager and **James W. Raynolds** to consultant to division general manager; Chemical and Metallurgical Division, General Electric Co. (Pittsfield, Mass.).

Francis Charles to Linden, N.J., plant manager, General Aniline & Film Corp.

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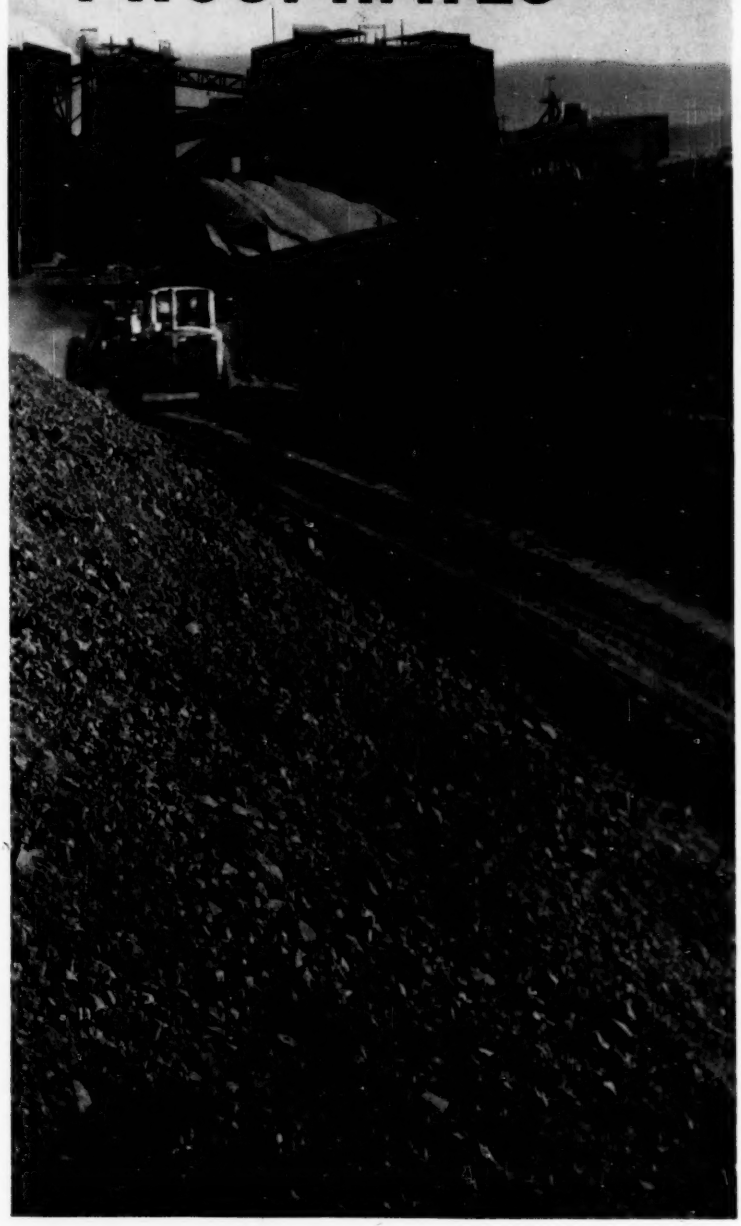

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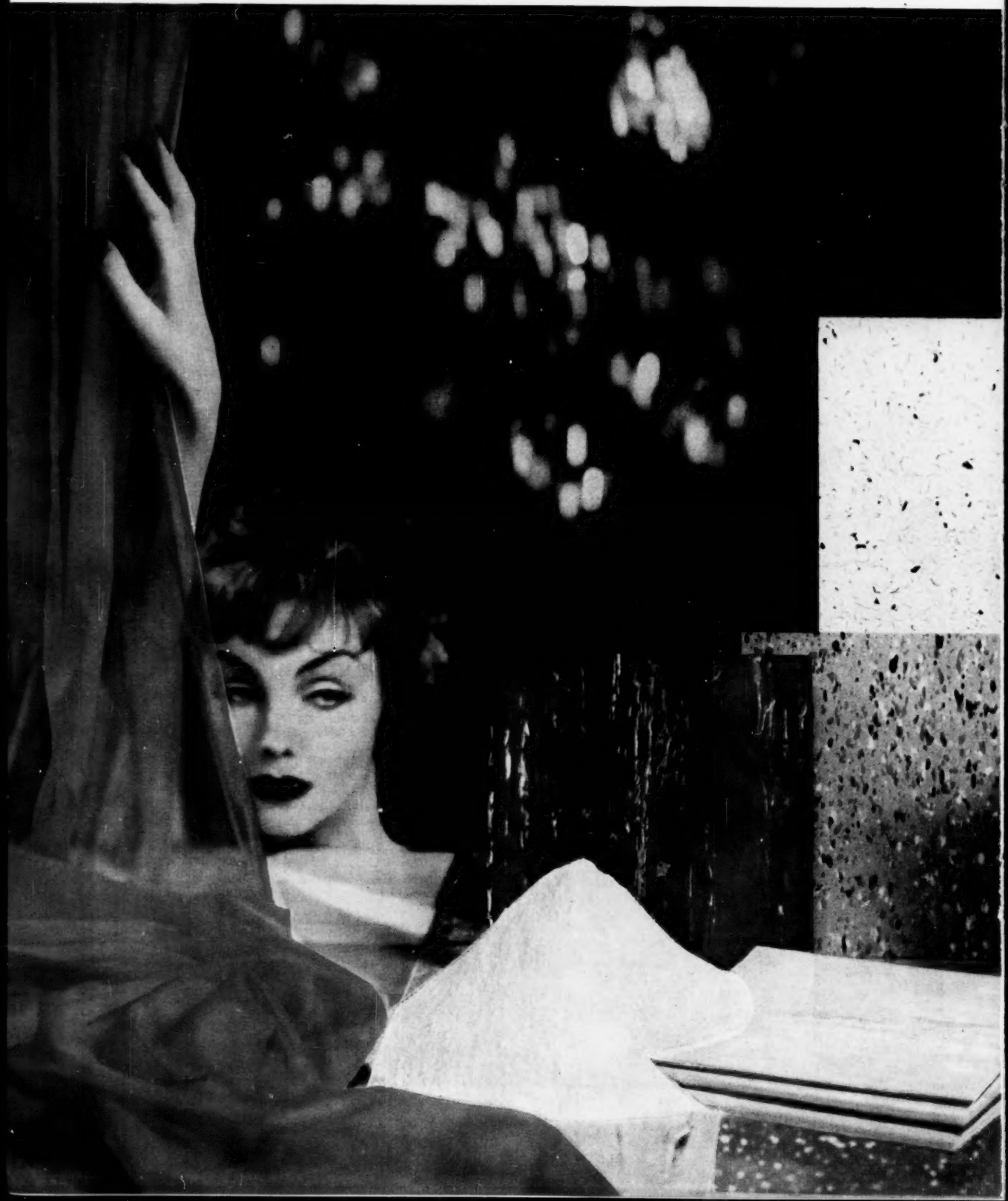
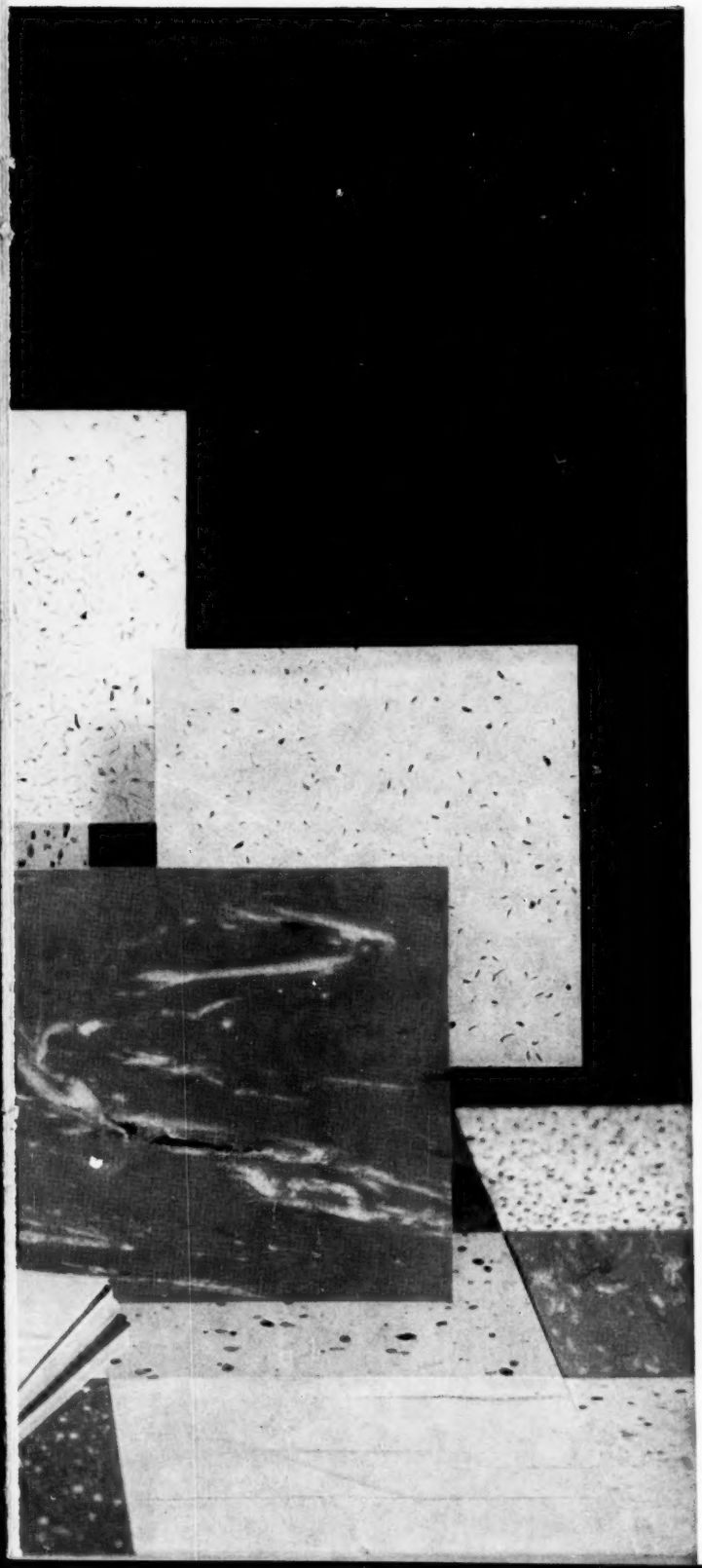


high style in floor tile



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The full TITANOX line presents the right pigment to make it easier to keep color effects uniform in asphalt, rubber or vinyl tile. And this applies to roll type floor coverings too—linoleum and felt base.

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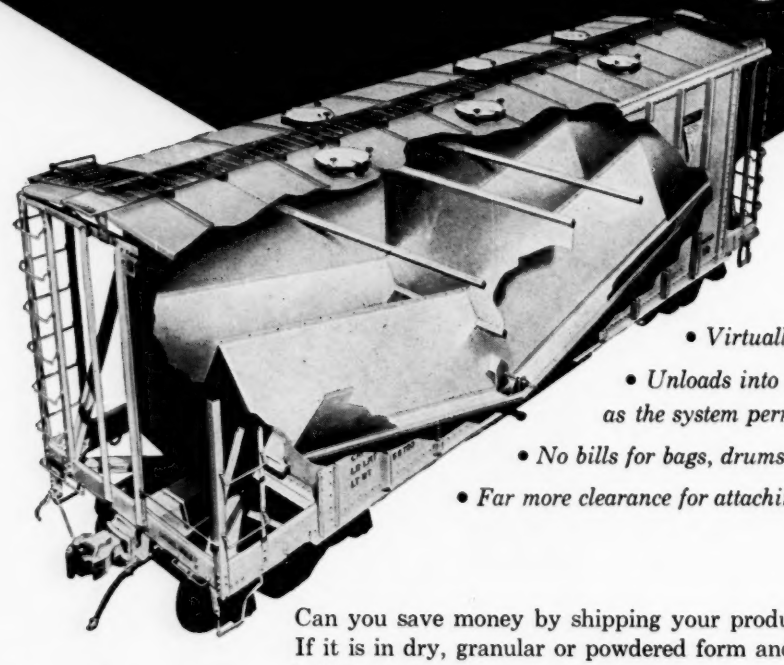

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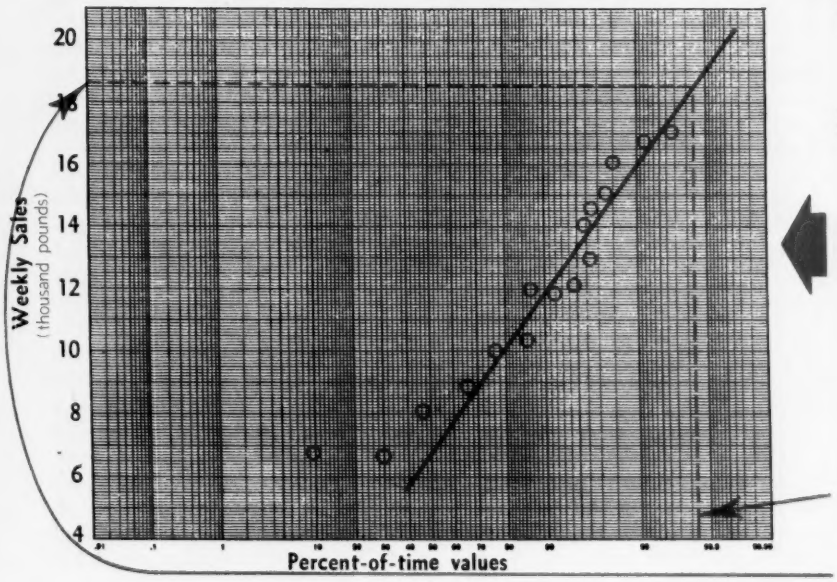
Seven Steps to 'Probability Paper' Inventory Control



1. List weekly sales in order of increasing magnitude.
2. Compute* percent-of-time that specific weekly sales levels are equaled or exceeded.
3. Plot percent-of-time values against corresponding sales.
4. Obtain management decision on desirable stock-out point.
5. Read off the minimum inventory corresponding to stock-out.
6. Establish formula for figuring your maximum inventory.
7. Compute the maximum inventory that your company needs.

Minimum inventory	18,300 lbs.
add	
Two weeks' average sales, adjusted to plant scheduling period and batch sizes	19,500
add	
One-half week's average sales (to take care of scheduling lag)	3,900
	41,700 lbs.
subtract	
Sales of lowest two weeks	6,200
MAXIMUM INVENTORY	35,500 lbs.

Simple System Keeps Tab on Inventory

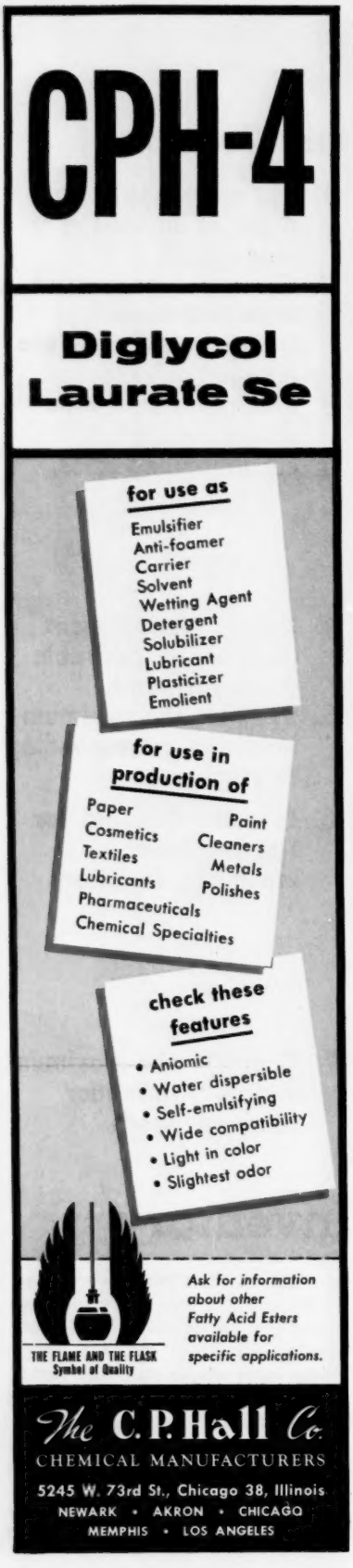
The simple statistical method charted above is the heart of a system that General Electric is adopting to control inventories of its insulating materials department's products. Originally developed for inventory control of some silicone products, the method is now proving successful in reducing reliance on individual product sales forecasts, establishing a stock-out level attainable through inventory control, closely gearing stock levels to actual sales and in limiting the occasions when a product is out of stock.

GE looked into several ways of tieing inventory closely to sales. It could possibly have devised a better way to make sales forecasts, which have such a big role in determining inventories. But sales forecasts are subject to many errors. Moreover, it is difficult to pinpoint demand for specific products in a given line, even though the forecast for a product group is accurate.

Because of a time factor and these limitations, improvement of sales forecasting was ruled out. GE sought some other simple statistical method that would avoid, if possible, detailed calculations and computer time.

Setting Up: First step in finding such a plan, says the manager of

* Unless a large number of plot points are available, percent-of-time values must be obtained from standard, mathematical tables of probability.



GE's insulating materials marketing administration, W. A. Ruderfer, was to check sales vs. inventory level over a representative period.

The study of one widely sold product quickly indicated that inventory control was lacking. It also showed that sales were occurring in a statistically random fashion (no one customer's purchases were preponderant), which suggested that sales might follow the mathematical law of "normal distribution." Verification that the law of normal distribution was applicable was the next step. This was done graphically by Ruderfer's team, which showed that by plotting weekly sales vs. cumulative frequency of sales occurrence a straight line would be produced on "normal probability" graph paper. This graph shows the inventory needed to match any selected stock-out level.

With this key in mind, GE started to devise its statistical approach to determine "minimum inventory." But first, management had to decide upon a "stock-out level." That means the number of weeks in a 100-week period that inventories are equal to, or less than, quantities demanded for shipment. For the product shown in the illustration, the stock-out level was set at 2% (18,300 lbs.). Thus, in actual practice, Ruderfer points out, the demand will exceed the inventory in only two out of 100 weeks. In one of these (for the case in point), only 1,300 lbs. of a 19,600-lb. demand would be unavailable.

To take account of seasonal shifts, GE decided to set two minimums. This led to separate plots and minimum inventories of 13,200 lbs. in the first season and 20,700 lbs. in the second.

GE then established maximum inventory levels by more conventional plans. The formula for maximum inventory worked out to be the minimum inventory plus output from two weeks' production (the plant scheduling period), plus one-half week's sales (the lead time), minus the demand from the two lowest sales weeks.

Checking the System: To keep tabs on the success of its new system, GE maintains a chart showing maximum and minimum inventories and the weekly sales. This provides an opportunity to rapidly spot deviations.

The probability method can also be used to maintain control of the total inventory. In GE's case, probability techniques were used on all large-sales-volume items, but maximums and minimums were arbitrarily set for small-volume items. Adding up all these gives an over-all maximum and minimum. When these figures are correlated with budgeted sales volume to give a turnover range, says Ruderfer, the figure is consistent with the inventory range of individual products and can be justified to management.

Ruderfer believes that the "probability paper" approach to inventory control is broadly applicable, provided that a product's distribution follows a discernible pattern. The method is unsuitable, however, when sales are extremely erratic.

In Ruderfer's estimate, the biggest value of the system is that it "replaces an arbitrary or intuitive system with one having a resemblance to mathematical logic." Furthermore, it works. And that's why GE has adopted the method—or a variation of it—for all of its insulating material products, and why other CPI companies might find it worthwhile.

CMRAAimsatMethods:

Next week, chemical market researchers will stream into French Lick, Ind., to learn about advanced market research techniques. The Chemical Market Research Assn. will be in session from Sept. 24-26, will offer a program stressing computers and new product market research. The program:

- "What Computers Can Do"—Jack Porter, Boston Insurance Co.
- "How to Use Computers in Market Research"—William Clark, Monsanto Chemical Co.
- "Correlations and Statistical Operations"—Werner Hirsch, Washington University.
- "Interviewing Techniques" — Audrey Langdon, consultant.

To look at market research for new products, CMRA has lined up Carbide's Robert Bateman (The Polyox Series), Commercial Solvents' Frank Dolian (Nitro Paraffins), Armour's Hoyt Corley (Fat Chemicals) and Dow's Parker Friselle (Chelating Compounds).

A new feature, an "Interrogation Panel" will offer participants a chance to question Arthur D. Little's R. F. Messing, Roger Williams Jr., Diamond Alkali's G. F. Rugar and American Cyanamid's S. D. Koonce.

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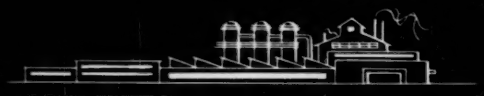

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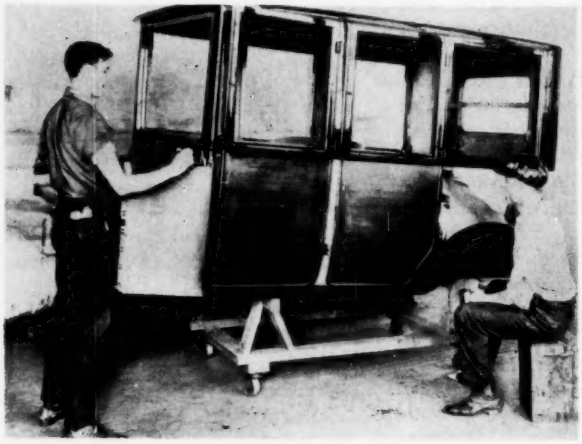
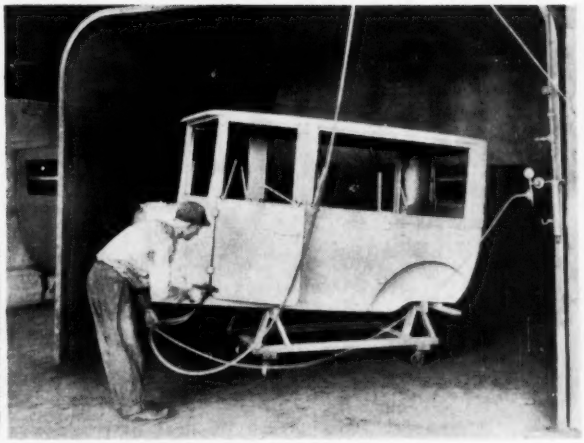


The varnish vanished from auto finishing when it was supplanted by the . . .



. . . use of nitrocellulose lacquers from spray guns. Nitro lacquers were, in turn, replaced by . . .

. . . acrylic lacquers, which are applied in only four hours to cars like the '59-model Buick shown here.

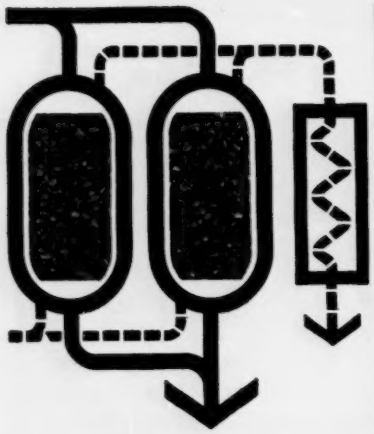
BRIGHTCLIFFE

The 59s: They'll Start with a Brighter Finish

When the '59 Buick is introduced to the public next week, it'll be wearing a coat of acrylic lacquer—the coating that General Motors has decided to apply to all its '59 autos. It is one of the most significant changes in auto finishing in recent years.

The complete switch to acrylics from nitrocellulose-type lacquers is the culmination of a trend that began as early as 1950. And it brings more than a big change to the paint field—it might also affect the auto polish business, since GM declares that the new Magic Mirror finish "retains its gloss at least three times longer and is approximately 22 times as colorfast as conventional lacquers," makes waxing and polishing unnecessary.

Chrysler, Too: GM won't be the only one giving paint and polish makers pause. Chryselr has made a switchover, too, quite different from GM's. All Chrysler-line cars will carry topcoats of what it calls "superquality enamels." These are the high-content (20-30%) melamine-alkyd type of finishes first tried by the auto makers because they produced better light-color finishes. They replace the 10% melamine and soybean oil alkyd formerly used. Chrysler used the more expensive, newer material on about 60% of the '58 models, so the shift is not as striking as is GM's (which had tried acrylics on only 25% of



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all of its '58-model production).

Also making the shift* to the higher-melamine materials for all its lines is Ford Motor Co., which reportedly covered 65% of its '58 models with it. Ford appears better acquainted with the new enamel than does Chrysler—it was using it to some extent as far back as '54.

Studebaker and American Motors both used the higher-melamine-content paint on last year's models and will continue to do so this year.

All trucks—including International Harvester's—will have enamel coats.

For U.S. paintmakers, GM's Fisher Body Division alone is a market for 7.6 million gal. of lacquer and 3.5 million gal. of primer, along with 9 million gal. of thinners and reducers.

Matter of Choice: Both the enamel and lacquer makers can claim advantages for their products. The acrylics made by Du Pont, Rinshed-Mason, Pittsburgh Plate Glass, have the edge in retaining initial gloss, are claimed to hold up better. In addition, they allow a wider range of metallic colors, are generally easier to refinish.

The enamels, on the other hand, are claimed to have higher stain- and solvent-resistance than acrylics and don't take six months to "toughen," as acrylics do. They're cheaper—about $1/car less than acrylics.

From the car makers' standpoint, enamels probably are a little easier to work with. For one thing they don't require buffing, as do the acrylics. Also, because enamels have a higher solids content, they usually require only two coats to get a 2-2½-mil finish, whereas four coats of lacquer are required.†

The enamels must be baked on; lacquers don't, ordinarily—but GM is apparently baking acrylic topcoats. After four coats of acrylic lacquer are applied to the car, GM bakes it for 30-45 minutes at 200-210 F. With enamels, the trend (made possible by heat-resistant melamines) has been to push the temperatures higher (around 300 F) and cut the time to about 20 minutes.

* General Motors also told *CW* there is a good possibility that it may use the acrylic finish on its '60 Australian models, and possibly on its Mexican models. There are no plans to switch the European or Canadian models.

†In the "varnish era" which preceded the switch to lacquer in 1924, it took 48 individual operations to apply, bake and air-dry successive coats of lead, putty, "half and half," rough sealer and three types of varnish. Each varnish coat required hand rubbing, and baking between coats took 12 hours at 90-130F temperatures. Air drying following each of 14 baking periods totaled about 108 hours.

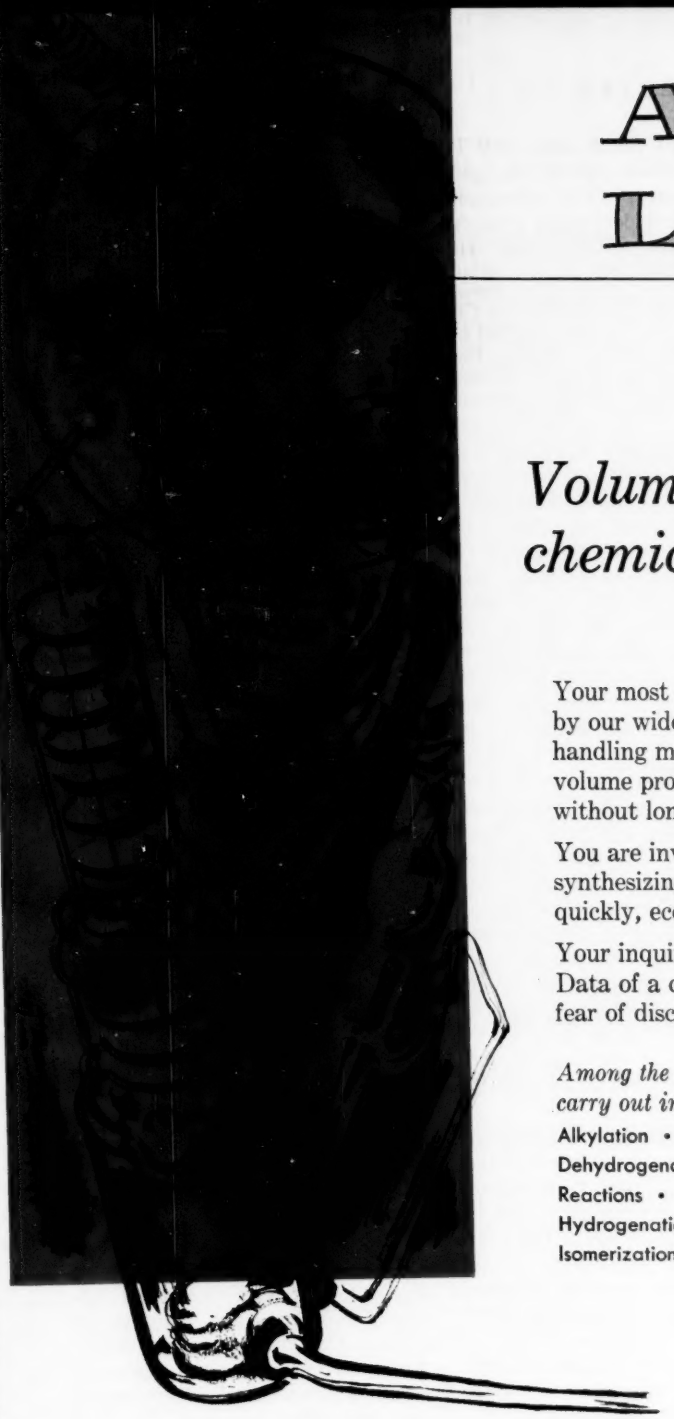
One disadvantage that the acrylics once had was the tendency of their solids to settle out. That's been overcome, however, by a special sprayer, which recirculates the lacquer—it is fed to the spray gun through quarter-inch plastic tubing, and the unused part is returned to the mixing tank through a smaller plastic tube.

Paintmakers say the acrylics probably will undergo less formulation change than will the enamels. Already, there has been a move by some enamel makers to substitute trimethylolethane for glycerol in making alkyds. Aim: better adhesion and weathering characteristics.

American Cyanamid, along with the Plastics and Coal Chemicals Div. of Allied Chemical, has happily watched the rise in enamel melamine content from 10% to the 20-30% levels. But Cyanamid is betting that melamine content may drop again—because of a new paint resin it is developing. Cyzac—as its novel melamine-alkyd resin is called—will go into some car enamels soon—possibly in '60 Fords. Typical formulations use Cyzac at about 15% concentrations (lower than current melamine requirements). Cyzac is said to provide a better metallic finish than acrylics, as well as to provide greater hardness and impact resistance. It also works well with low-cost alkyd emulsion primers. Restricting its use now are two factors—Cyzac is a two-part system, needs a catalyst for stability, and it is relatively costly.

Where's the Water? There are more upcoming auto-finish changes. All manufacturers claim to be working on water-based topcoats and there's pretty general agreement that such paints will be the finishes of the future. Nobody, however, is willing to guess when this will take place. One thing most agree on: when a water-based material does come out, it will be a sprayed-on material. Dip coatings aren't practical, due to the contours of American cars; bodies would need many drain holes—and holes are potential corrosion spots.

Under It All: There'll be some changes made in primer coats too. General Motors has switched to an epoxy coating from a modified alkyd. The change from alkyd to epoxy was also initiated this year by Chrysler; Ford made the shift somewhat earlier. About the only auto maker still



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using an alkyd primer coat now is Studebaker, which sprays it, and American Motors, which dip-coats. Trucks, too, have new epoxy primers —Dodge trucks will get them this year for the first time.

Lincoln is the leader—without followers as yet—in the use of water-based preprimer. All its models are dipped in a preprimer based on butadiene-styrene latex. Finish coats are conventional.

Wax on the Wane: Polish makers, who supply auto waxes worth $50 million/year, have watched all these changes warily. The auto companies will push the "no-waxing-necessary" idea for the new cars this year. This certainly isn't calculated to brighten polish makers' profits. But wax makers (Simoniz, Johnson, Plastone) told *CW* that their business probably would not be hurt much in the long run. They recommend their waxes for acrylics as well as for the other types of finish.

S. C. Johnson's statement to *CW* about the no-waxing claims: "The new finishes offer the car owner greater durability and greater gloss retention, which does mean easier and less maintenance. However, there's no doubt that waxing is advantageous. Even though the new finishes have considerably improved gloss retention and durability, there's still some need for material to remove surface dirt, add to "depth" of color and in general keep the car looking in first-rate condition."

Makers of the new finishes told *CW* that, although the initial luster of the new finish is held many times longer, the motorist will eventually want to wax his car. Makers say: "The need for waxing is delayed."

Apparently the situation is somewhat similar to that faced by floor polish makers several years ago—vinyl tiles were first claimed to need no waxing. But there were few people who did not wax their vinyl tile.

Makers of road tar removers (mostly formulated with aromatic solvents) have changed their recipes because aromatics are solvents for the acrylic lacquers. Some companies have already reformulated products with an aliphatic base, and though this gives a product said to be less effective than the older materials, there's little danger that sales of these materials will be affected by the switch to acrylics.

Where from Here? There's little doubt that the auto companies are still searching for an ideal finish. Next year will see still more changes in both the enamel and lacquer systems. Paintmakers have learned that they can't "park" research in the auto field, and they've taught that lesson to makers of auto specialties, too.

British Cosmetics

British manufacturers' sales of cosmetics and perfumes totaled $95 million last year, according to a survey by the research organization, Political and Economic Planning. Exports accounted for $22.7 million, almost one-quarter of the sales.

Consumer expenditures on the products (which don't include soap, dentifrices or shampoo) totaled $17.3 million, including markup and sales tax (90% on most items last year). That averages out to about $8.50 for every British woman over 14.

Though manufacturers' sales have been rising steadily (last year's total was $16.4 million above '54's), the number of firms in the field has decreased. From a high of 1,100 firms in '48, the number last year was only 240.

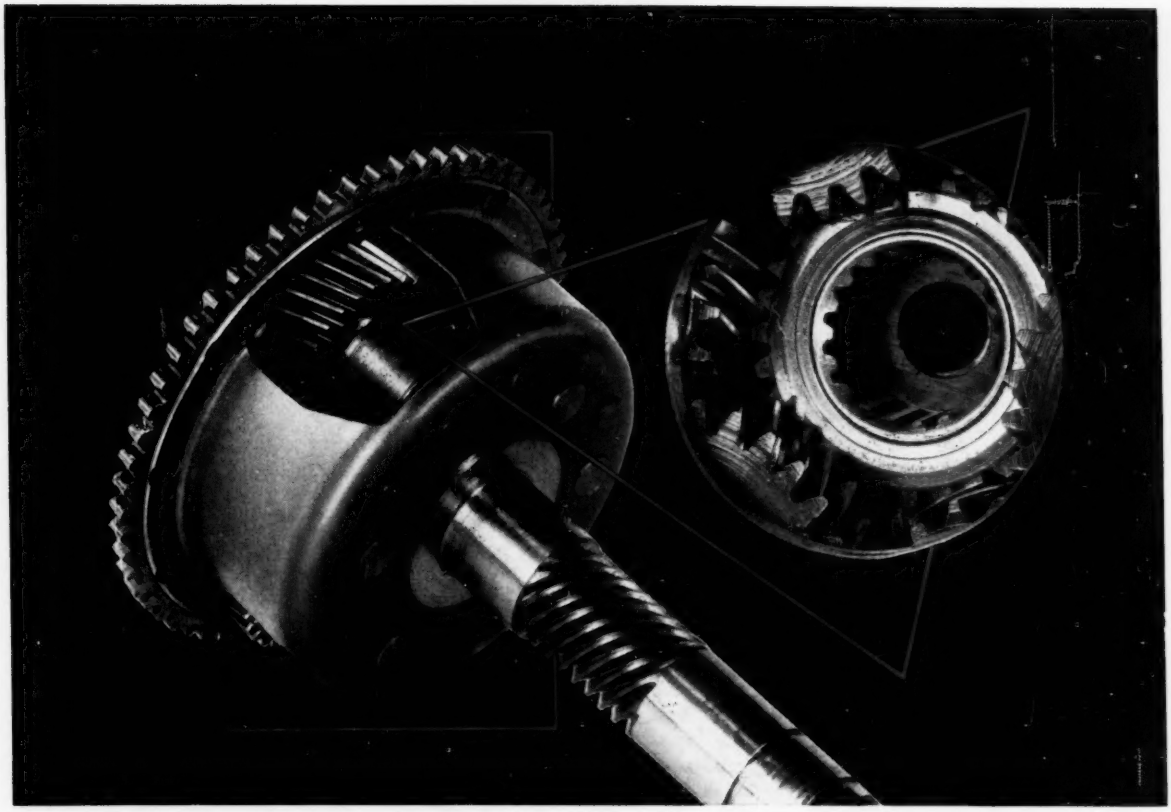
Among the cosmetic habits of British women, aged 16-64, analyzed by Political and Economic Planning, three out of four use face powder and lipstick, half use foundation or vanishing cream, two out of five use hand cream or lotion, one in five uses cold cream, and a quarter use a deodorant.

PRODUCTS

Quartet of Killers: Du Pont is bringing out four new pesticides: Du Pont Chickweed Killer, based on neburon; Du Pont Crabgrass Killer, based on amine methyl arsonates; Manzate maneb fungicide, a tomato and rose fungicide; and Du Pont Combination Garden Spray, containing methoxychlor insecticide and Parzate zineb fungicide. All four products are made for use in home sprayers.

•

Push-Button Vitamins: Abbott Labs. (Chicago) is now offering vitamins in aerosol containers. Nitrogen is the propellent in Abbott's multivitamin product called Vi-Daylin Pressure Pak.



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Men who daily face the challenge of solving new lubricating problems or who seek better solutions to old ones frequently find the answer in ADM Spermoils. Perhaps you, too, can profit by formulating with this finest of all known natural lubricants. Here quickly, are a few of the reasons:

Sperm oil resists oxidation and is non-corrosive. Chemically, it is remarkable because it is largely made up of the higher fatty alcohol esters of the higher fatty acids. Its unsaturation is practically all mono-unsaturation. Each molecule of the ester contains but one double bond in each of the fatty acid and alcohol parts of the ester.

Two ADM sperm oils you should know more about are ADM 45° (N.W.) and ADM 38° (N.W.). N.W. is short for Natural Winter, and refers to processed oils from which solid spermaceti wax has been removed. The temperatures indicate maximum cloud points.

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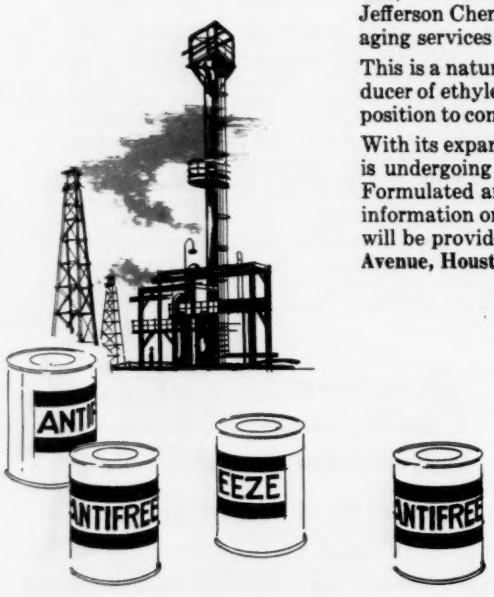

Yes, with its new ethylene glycol plant and consequent expanded capacity, Jefferson Chemical offers bulk formulated antifreeze as well as complete packaging services for private label customers.

This is a natural extension of Jefferson's activities in this field. A leading producer of ethylene glycol since the company was formed, Jefferson is in an ideal position to control product quality from raw material to formulated antifreeze.

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2. A new powder-compacting copper strip mill

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Industry Eyes Copper Strip from Scrap

Copper fabricators are this week looking into the commercial prospects of a pair of new processes that turn copper scrap into competitively priced metal products with a bonus: improved physical properties.

The team: an improved copper recovery process, developed by The Fluor Corp., Ltd. (Los Angeles), that reduces the cost of converting low-grade scrap into specification-grade copper powder; a new strip-rolling mill process, developed by E. W. Bliss Co. (Canton, O.) that compacts the copper powder into ductile, high-strength copper strip.

Copper Recovery: Fluor's interest in the scrap-copper recovery process dates back to 1954. In '56, it took over the operation of the semicommercial powder-from-scrap plant of Whitaker Metals Corp. (in which Whitaker Cable Corp. is a major stockholder). The process employed in Whitaker Metals' 7½-tons/day unit is an ammonium carbonate leach-hydrogen reduction technique, licensed from Chemetals Corp.

In the slightly more than two years that Fluor has been operating the plant, several engineering developments have come to light that, the company says, enhance the economic prospects of the process. Fluor felt that these three were most significant

- The discovery, by Sherritt Gordon Mines Ltd., of additives that promote reduction. SG uses the ammonium sulfate system for leaching nickel ores in its version of the process, developed the additives to prevent agglomeration of products in the system. Fluor has since discovered several other agents that speed reduction, reduce heat requirements and recirculation rate, and cut the number of autoclaves needed.
- A thorough evaluation of the effect of plant size on operating economics. Its experience in the Whitaker plant showed Fluor that small-capacity plants (less than 25 tons/day of copper powder) would likely be marginal operations; that larger installations (around 50 tons/day) are more economical.
- Reduction of operating costs by increasing the initial capital investment. Operating economics of the scrap recovery process are such, says Fluor, that the capital expenditures will be more than offset by savings in operating costs.

Emphasis on Chemicals: This copper-scrap recovery project underscores Fluor's earlier-reported intention to branch out into the construction of chemical processing plants *(CW, April 26, p. 82)*. In this instance, the company's experience in handling high-pressure hydrogen required for precipitating powdered copper out of leaching solutions—a relatively new technique to metallurgical processors—is a good example of how technology developed in one field pays off in another.

Several of Fluor's technical departments had a hand in the copper recovery pilot operation. First to tackle the project were the process engineering and development groups that conducted studies of the process initially employed in the Whitaker pilot plant. Later, the research department, delving into the chemistry of the process, took over the operation of the plant. More recently, management responsibility for the pilot operation was delegated to Paul Strub, assistant to President J. Simon Fluor.

Latest fruit of the firm's labor is the engineering design (completed around July) of a 50-tons/day plant for a client who is considering a commercial powder- and strip-producing installation in the Midwest.

Novel Products: Although the copper strip produced by the combination of processes is expected to be cheaper than strip from cast copper, Fluor believes that a big advantage may prove to be the special properties it imparts to finished products. The company is confident that competitively priced copper powder will find its way into a number of new uses, says that applications are limited only by imagination and ingenuity. But for the present, it is concentrating on the use of powder for copper strip, pre-

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ENGINEERING

fers to nail down this application before becoming involved in extensive development of others.

The unique physical properties of powder-based copper strip appear to be due to the small grain-size of the metal—about half that of conventionally rolled strip. Close control of each step in the scrap recovery process assures uniformity of the fine powder that the special rolling and sintering operations compact into fine-grain metal strip.

Equipment Role: Equally as important as the chemical recovery process is the mill equipment that turns out the finished strip. Equipment development credit goes to E. W. Bliss Co. Here's how it does the job:

Copper powder is fed to a pair of side-by-side compacting rolls (conventional rolls are one above the other). Steam is sprayed into the powder at the rolls as a binder and to reduce powder flow; rotating disks at the edges of the rolls control the width of the strip formed. The strip produced by the compacting rolls is about 70-80% dense and friable.

In the second operation, the strip is fed continuously through a sintering furnace in which a reducing atmosphere is maintained. Strip movement here calls for deft handling since the furnace temperature is only 50-100 degrees below the melting point of the metal. After sintering, the strip is passed through additional hot-rolling, cold-rolling and conventional annealing operations to squeeze it to the required thickness of fully dense metal. Rolling cost by this method, Bliss estimates, is less than 3¢/lb., compared with about 7-10¢/lb. for conventional strip-mill rolling. This saving is due, at least in part, to the elimination of preheating, cleaning and pickling operations used in making strip from cake copper.

Total cost of a plant designed to produce 50 tons/day of strip from copper scrap is about $10 million. The investment in the strip-rolling facility (including its share of the hydrogen-producing unit and other utilities) would account for 20-25% of the total. The copper extraction portion of the plant would also include equipment for the recovery of processing chemicals and by-product metals (e.g., solder, from radiator scrap; zinc, as zinc oxide) from the scrap.

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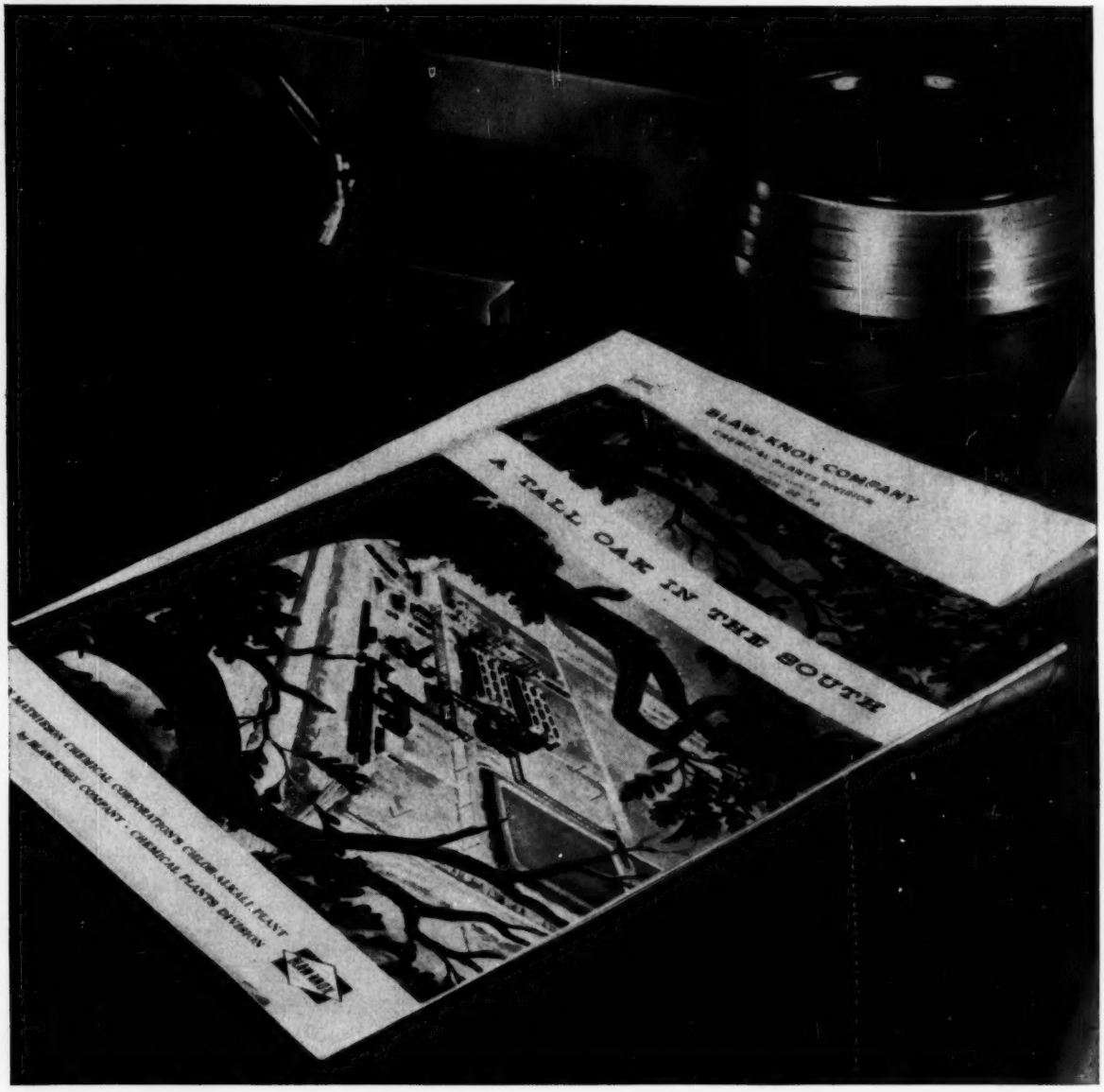
Blaw-Knox reports on the engineering, **construction and expansion of Olin Mathieson's chlor-alkali plant at McIntosh, Alabama.**



A progress report on chlor-alkali production

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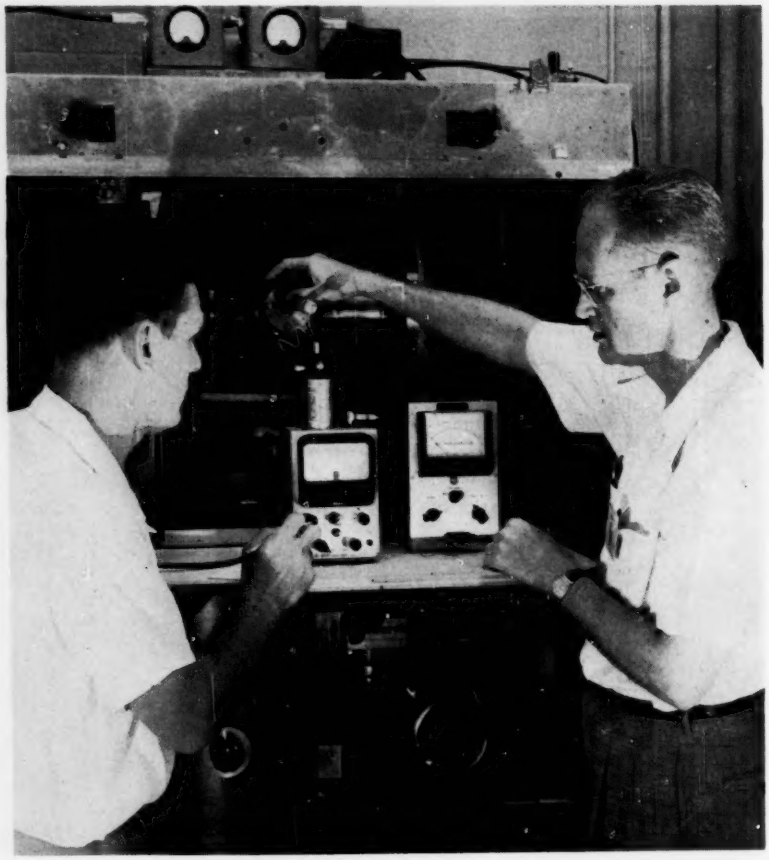
Bliss both feel that other metals besides copper, as well as some alloys that are hard to make by conventional means, may eventually yield to similar powder compacting methods. And it's a good bet that metallurgical fabricators in other fields will keep a watchful eye on copper producers' progress with the new pair of chemical processes.

Know-How Exchange

Eschewing the engineer's customary reticence regarding hard-won process know-how, a group of technical representatives from France, Germany, Japan and the U.S. met in New York last fortnight and freely swapped information on their latest processing tricks. Occasion: the first international



Probing Plasma for Fusion Clues

Readying the discharge tube assembly for a basic study of plasma (a gaseous mixture of ions and electrons) are Albert Hatch (*right*) and Leroy Pahis, of Argonne National Laboratory (Lemont, Ill.). In a paper presented at the Geneva Atoms-for-Peace conference, Hatch described ANL's work as a basic research effort aimed at the fundamental nature of plasma. The results of this work are designed to aid in development of controlled thermonuclear fusion reactions. ANL will utilize a radio-frequency voltage (above 5 megacycles/second) to ionize traces of gas at about 1 millionth atmosphere pressure. Plasmas so formed are expected to be more stable than those energized by direct current effects, as they are in the "pinch" experiments.

Among phenomena to be studied are plasmoids, sharply defined plasma formations whose stable geometrical shapes may indicate a possible plasma containment mechanism.

symposium sponsored by Scientific Design Co. (New York) for licensees of its ethylene oxide process *(CW, Feb. 15, p. 81).*

General Aniline & Film Corp. was host to its fellow SD licensees, took the visitors on a tour of the recently completed GAF plant at Linden, N.J.—newest and largest SD ethylene oxide installation. On the second afternoon of their busy two-day schedule, the conferees took time out between technical discussions to visit SD's catalyst manufacturing plant and digital computer facility.

The formal part of the presentation consisted of technical papers on improved catalyst manufacture, modified plant design and new operating techniques. Copies of papers were made available in French, German and English; interpreters translated at informal discussions.

The conferees were pleased—and a little surprised—with the quality and quantity of technical information exchanged at the parley, says SD. And both the company and its participating licensees are looking forward to a repeat performance of this experimental idea-trading session.

PROCESSES

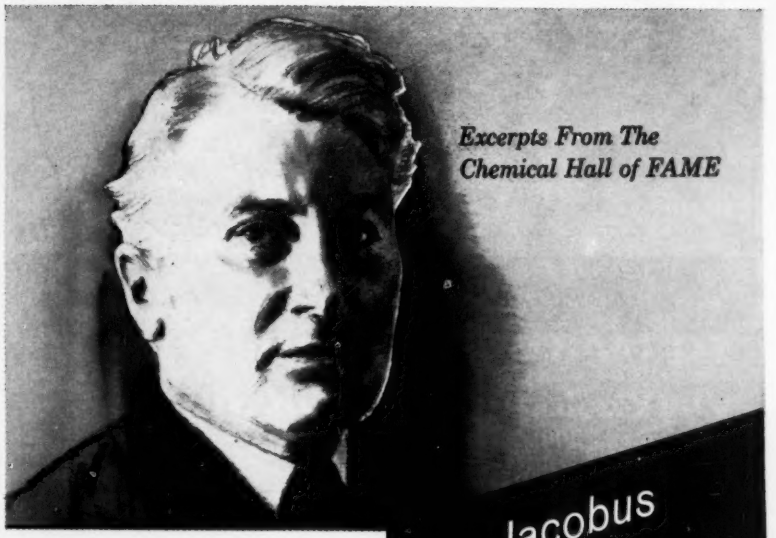
Full Cleanup: A continuous method of removing fission products of high-neutron cross-section from fused-salt nuclear fuels was described by Oak Ridge National Laboratory scientists at last week's American Chemical Society meeting in Chicago. The method is described as a solvent extraction process for replacing the fluorides of samarium, europium and gadolinium with that of low-cross-section cerium.

•

Underground Gasification: U.S.S.R. reportedly plans construction of the "world's biggest" underground coal gasification project in western Siberia. Gas equal in heating power to 1 million tons/year of coal will be supplied to Kuznetsk Iron and Steel Co.

•

Brown Coal Utilization: Czechoslovakia is constructing a gas plant that will utilize brown coal with a water content of 40% and ash content of 15-20%. The method, involving oxygen and steam, reportedly will produce 475 million cubic meters/year of gas from 1.8 million metric tons/year of brown coal.



Excerpts From The Chemical Hall of FAME

Jacobus Henaricus van't HOFF

1852-1911

Present views of stereochemistry stem from Jacobus Henaricus van't Hoff's "La Chemie dans l'Espace." For his discovery of the cause of optical activity in carbon compounds, van't Hoff received in 1901 the first Nobel prize for chemical achievement.

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Technology Newsletter

CHEMICAL WEEK
September 20, 1958

Eastman Kodak's new Kodel polyester fiber will debut commercially in some apparel lines next spring. It's said to be more resistant to pilling (tendency of a fabric's surface fibers to form in balls) than other synthetics, thereby making possible new types of fabric. Kodel's other properties that are calculated to intrigue textile men include natural whiteness and ready dyeability; good heat resistance, dimensional stability and covering power; ease of handling on all three standard spinning systems (cotton, woolen and worsted) and on conventional production and dyeing equipment.

The fiber is being made by Tennessee Eastman Co., division of Eastman Kodak. Eastman won't talk process details or capacity, expects to step up production in '59. Currently, only staple Kodel is offered, but the continuous filament yarn will be along next year.

•

Dust desiccation shows promise for control of numerous insects besides cockroaches (*CW Technology Newsletter, May 31*), University of California (Los Angeles) entomologists now find. Termites, houseflies, mosquitoes, ants, fleas, ticks, etc., are killed by the dusts. Outstandingly lethal powders (which absorb the wax coating insects need to protect vital body moisture) are fuller's earth clays, diatomaceous earths, silica gels, aerogels and precipitates. Walter Ebling, director of the studies, believes the new treatments promise a cheaper, longer-lasting way to control insects. The nontoxic dusts have often been found to kill insects quicker than potent insecticides; insects are believed unlikely to develop immunity.

•

Field tests of Lederle's experimental oral polio vaccine in Latin America and Minnesota are encouraging. More testing lies ahead—both by Lederle and by the government—but the vaccine is now believed to be workable. And it's potentially cheaper, more convenient to take than Salk shots.

•

Ciba has turned up a new reserpine-derived tranquilizer (3-dimethylaminobenzoyl reserpate). It has about one-fourth the tranquilizing effect of reserpine—but only one-fortieth of its hypotensive action in animal tests. It is getting clinical tests.

Ciba researchers have also prepared a compound (methyl carbethoxysyringoyl reserpate) that's about as strong a hypotensive agent as reserpine but is only one-twentieth as active as a tranquilizer. It will be marketed soon under the tradename Singoserp.

•

Steel mill in Montana? That's a possibility with a new steelmaking technique uncovered by U.S. Bureau of Mines (Albany, Ore.). Investigations there indicate the feasibility of producing high-purity iron (99.6%) directly from high-grade concentrates of Montana ores in a one-

step electric smelting operation. According to the bureau, steel can be made from such iron without subjecting it to the usual desilication and decarburization. That means the technique could be used in making steel ingots for small rolling mills in fuel-deficient areas (such as in Montana), where it is impractical to install blast furnaces, converters or open-hearth furnaces. The iron, says the bureau, would be especially useful in making steels low in "tramp" elements such as copper and nickel.

Ore used in producing the concentrates was from the Carter Creek deposit, near Dillon, Mont., and was furnished through the cooperation of Minerals Engineering Co. (Grand Junction, Colo.). The deposit is reported to contain over 50 million tons of proved ore.

•

An ultrasafe training and research reactor that's said to be substantially cheaper than reactors of comparable power (1 kw.) has been designed by Vitro Engineering Co., a division of Vitro Corp. of America (New York). The core is designed to go critical at 65 F. On failure of any type, the reactor absorbs heat from its surroundings as well as its own fission heat and goes subcritical. No electronic instrumentation or control rods are necessary for safe operation.

•

Broad-spectrum multiple vaccines (*CW, July 19, p. 61*) may be nearer, due to a new laboratory machine developed by Karler Laboratories (Berkeley, Calif.). Called the "spectrolator," it separates complex substances by combined chemical and electrical methods. It's expected to isolate specific immunizing agents from vaccine materials, a big problem in vaccine research. The machine, under development for the last seven years, is being readied for production by Karler Labs and Microchemical Specialities Corp. (Berkeley).

•

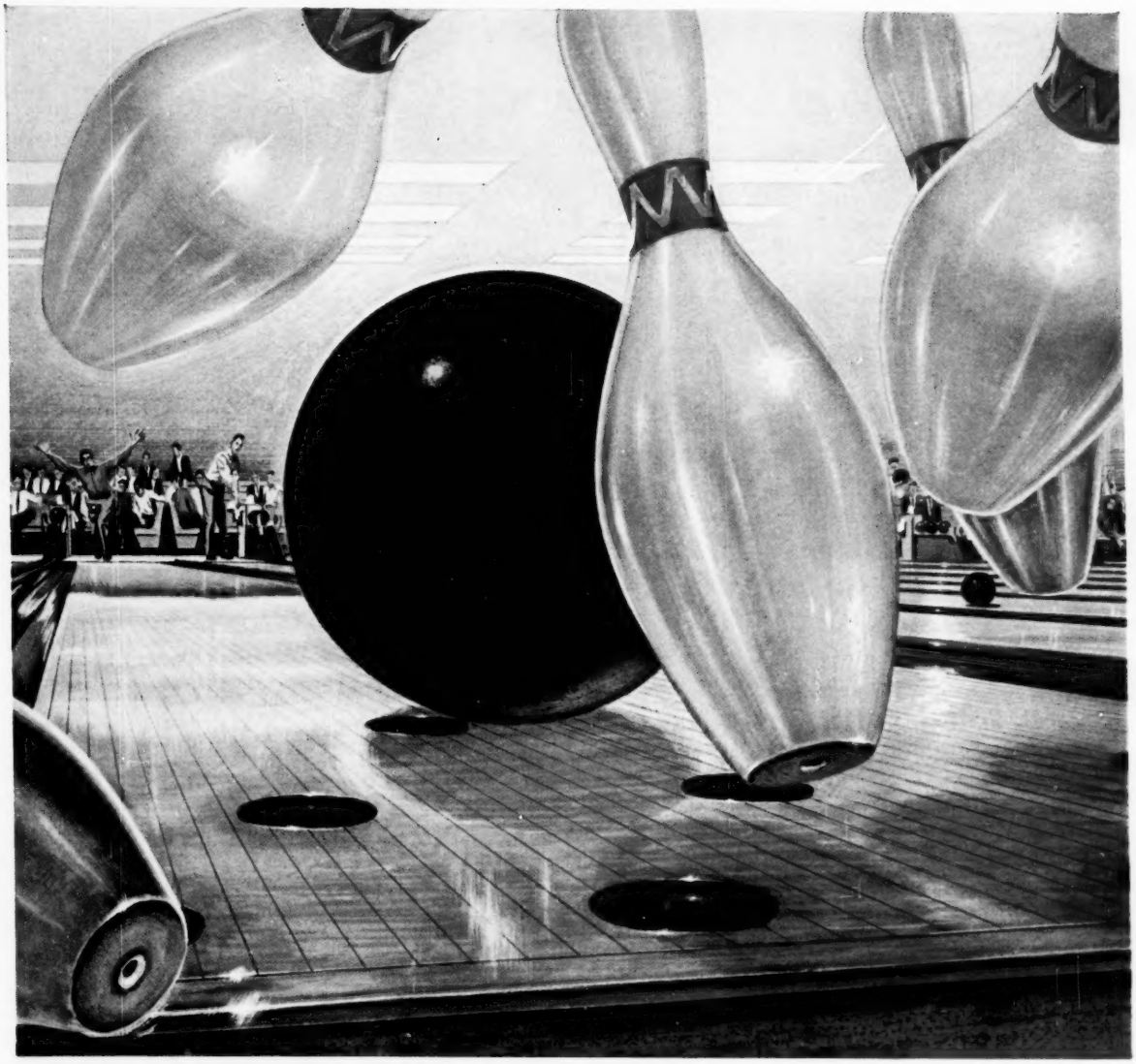
A new polyester for reinforced-plastics applications that will withstand 1000 F for short periods, 500 F indefinitely—temperatures that would destroy many competitive polyesters—is being produced commercially by Naugatuck Chemical Division, United States Rubber Co. Called Vibrin 136A, the material was developed jointly by Naugatuck and Boeing Airplane Co.

•

Phillips Petroleum calls its cis-polybutadiene synthetic rubber a "spectacular" success in truck and passenger tire tests. The synthetic consistently outperformed natural rubber, says Phillips, giving 30-40% longer treadwear on passenger tires and less heat generation in truck tires (*see also CW Market Newsletter, p. 90*).

•

An economical method of isolating 8-methoxypsoralen from lime oil is sought by University of Florida researchers. The chemical has long been used in treating idiopathic vitiligo, a skin disease, and has recently been touted as a systemic antisunburn pill.



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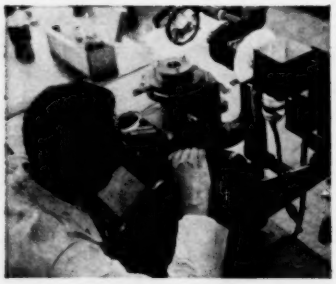

Co-ordinated Research

Pure research into fabrication of glass, ***packaging research*** into processing and handling methods in customer plants, ***market research*** into consumer attitudes. All add up to greater packaging value.

Engineering Design

At Owens-Illinois, your package's *three* needs are taken into account: 1) Considerations of its function in the retail store, 2) its operating efficiency, and 3) its consumer utility.

The Right Container

There's an O-I container to meet your special needs: Duraglas containers; Libbey Safedge packing tumblers or premiums; Kimble Ampuls and Vials; and a variety of plastic containers.

The Right Closure

Through long and continuing research O-I has developed the most advanced metal and plastic closures. Helping you choose the right closure is another function of O-I's packaging service.

Needed Fitments

O-I specialists are keenly aware of sales benefits derived from plastic shaker and pour-out fitments which are not "gadgets" but which increase consumer satisfaction with your product.

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Modern cartons developed to serve you efficiently in the retail store and warehouse . . . as well as on your own filling line and in transit. This is the new openized carton with easy-open flaps.

They're easy to store, easy to use, when packed in glass

For a brighter, lighter life... so many wonderful household products are packaged in glass

TODAY'S work-saving household products such as window cleaners, bleaches, waxes, polishes, liquid detergents, and many others, make housekeeping an easier job.

Packaged in glass, these products not only look more attractive, for faster sale—but are simple to handle and provide maximum assurance of protection. It is the unique quality of *inertness* that enables glass to protect such an astounding *range* of products so valuable and useful in every-day life.

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- **CLEAR, NON-FOAMING DISINFECTANTS** are possible using cresylic acid and Stepanate "X".
- **DISSOLVING IODINE IN TINCTURES**
- **THINNING SOAP GELS**
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CW PHOTO—LIONEL CRAWFORD

'House of Color': A display of home furnishings in the modern vein at the New York Coliseum.

Home Furnishings: Lush Market for CPI

This week thousands of homemakers are flocking to New York's Coliseum—scene of the Ninth Annual Home Furnishings Show—to view the latest creations of the nation's leading designers and manufacturers of home furnishings. But the process industry visitor sees more than just new products; he sees a great market for chemicals in the multimillion-dollar home furnishings industry.

Highlighting illustrations of chemistry's large home role is Eastman Chemical's contribution to the show —a spacious five-room "House of Color" *(above)* that shows how chemistry and electronics join forces to make modern homes more convenient and comfortable. Fortunately for the chemical and allied industries, Eastman's exhibit clearly reflects the eagerness of most homemakers to use the new and serviceable synthetic construction materials from the chemical industry.

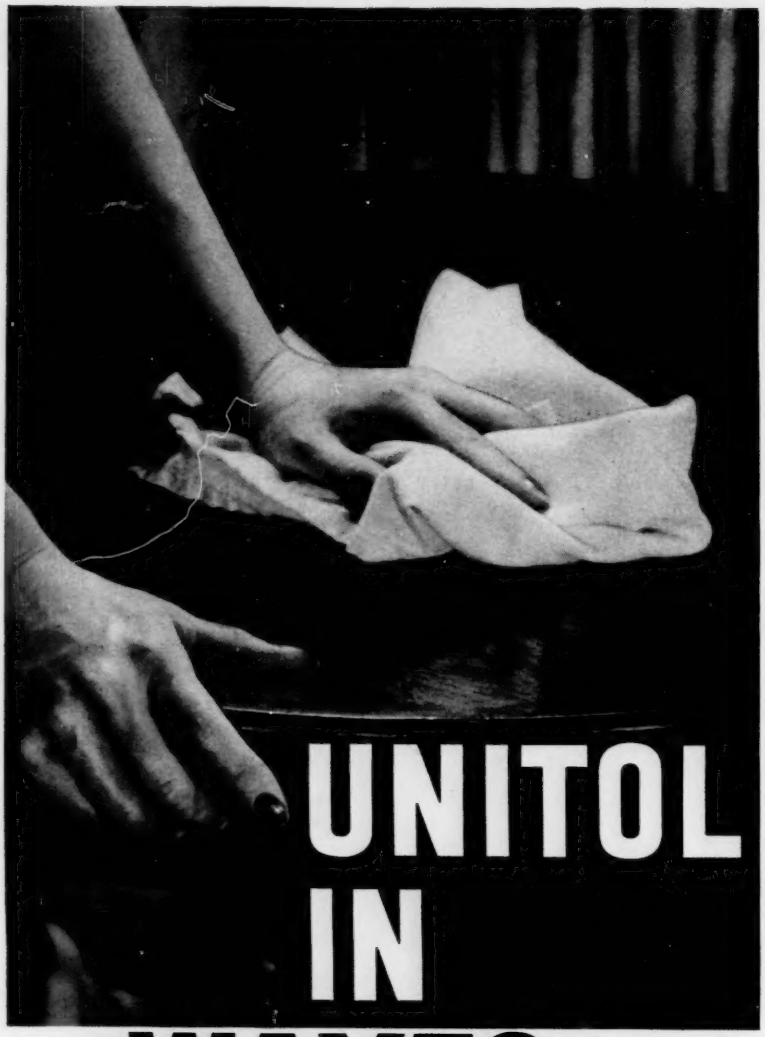
Eastman's Chromspun House of Color represents the composite effort of many manufacturers and suppliers, who provide everything from doors to flooring, lighting fixtures to the complete home music center—a duplicate of Radio Corp. of America's exhibit at the Brussels World Fair.

Plastics Parade: Initial acceptance of plastics in the home was hampered by beliefs that they were "substitutes" for wood, glass and metal. But the "ersatz" label is fast disappearing and plastic products are now being accepted as standard furnishings throughout millions of American homes.

For example, some 1.5 million lbs. of polystyrene will be used in '58 to make furniture legs. This is almost four times as much as used in '57. But it's only half the amount predicted for 1960.

Another 1.5 million lbs. of polystyrene will be used this year to make molded drawers. Also, consumption of phenolics for drawer-making is estimated at 500,000 lbs. A far larger outlet for phenolics is manufacture of casters, which will this year require some 2 million lbs.

One of the sizable plastics markets is decorative laminates. They will take 40 million lbs. of plastic in '58. Some 9 million lbs. of this will be melamine resins (for decorative sur-



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faces), and 31 million lbs., phenolics (for undersides of laminates).

Other materials used in home furnishings, according to industry sources, are: 6 million lbs. of monofilaments (saran, vinyl, nylon), 500,000 lbs. of polyethylene film for furniture covers, and 60-70 million lbs. of vinyl sheeting (supported and unsupported) for furniture upholstery.

Housewares: The housewares market—kitchen utensils, containers, shower curtains, etc.—is an industry in itself. Its plastics consumption is variously estimated at 140 to 150 million lbs./year. One breakdown of '58 demand: vinyl, 35 million lbs.; styrene, 33 million lbs.; polyethylene, 70 million lbs.

The obvious supremacy of polyethylene—a relative newcomer—has been established primarily at the expense of polystyrene. In '52 polystyrene had the housewares market pretty much to itself, and retail sales of such products hit $100 million. Polystyrene consumption then ran about 50 million lbs./year. This was considerably more than the 30-33 million lbs./year of polystyrene now being consumed in the U.S. at the retail level.

Will polystyrene eventually lose still more of its housewares markets to polyethylene? Opinions differ. Some observers say the encroachment by PE will continue, while others say polystyrene demand for this application will remain at about 30 million lbs./year. The position of adamant polystyrene boosters who aver there will be a swing back to polystyrene seems increasingly untenable—will be more so when high-density polyethylene and polypropylene go all out for their shares of the market.

Demand for vinyl in housewares is estimated like this: shower curtains, 28%; closet accessories, 20%; adhesive-backed film, 16%; table covers, 16%; furniture covers, 12%; appliance covers, 8% (of 35 million lbs. total needs).

In recent years melamine resins have come into their own in manufacture of dinnerware. Earlier this year the Melamine Council reported that sales volume of melamine dinnerware hit an all-time peak of $70 million in '57; that's 16% more than the $60 million worth sold in '56. Estimates by the trade of future growth range from 25% to 50% more

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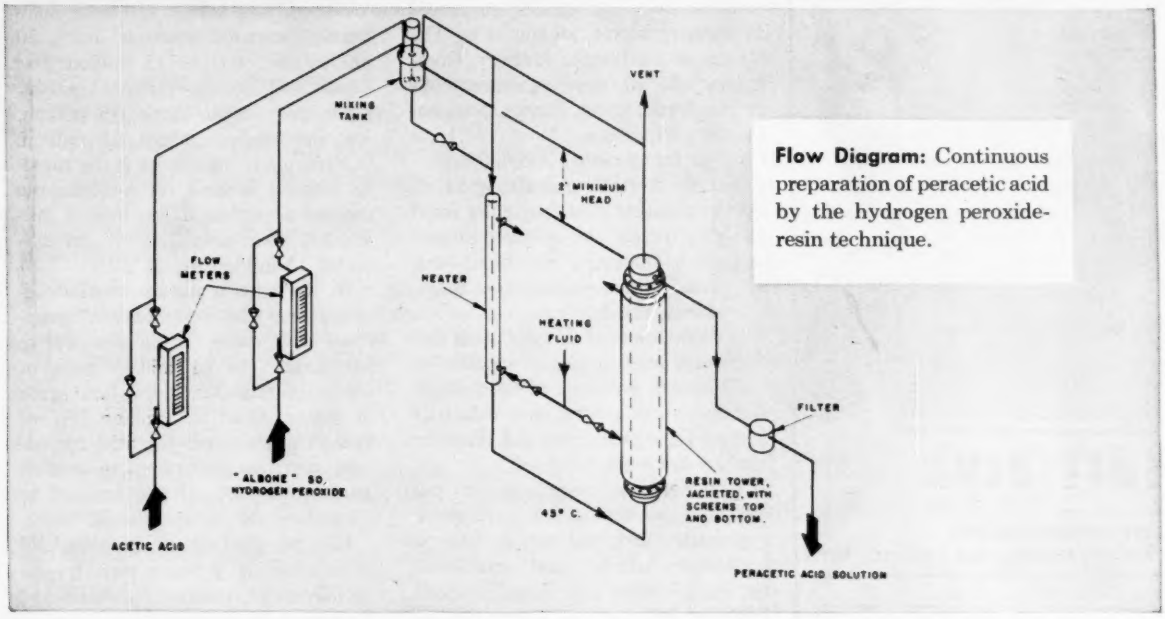

Flow Diagram: Continuous preparation of peracetic acid by the hydrogen peroxide-resin technique.

Du Pont process converts hydrogen peroxide to peracid in minutes . . . shortens route to useful products

Here's a quick way to activate hydrogen peroxide in organic chemistry by converting it into peracetic acid. Ordinarily requiring 7 days to reach equilibrium, the conversion of peroxide to peracetic acid can be speeded to an overnight wait by use of mineral-acid catalysts.

But: Du Pont's process allows you to obtain peracid in minutes.

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- **Ketone Cleavage**
- **Sulfur Oxidation**
- **Nitrogen Oxidation**
- **Polynuclear Cleavage**
- **Phenol Preparation**
- **Polymerization**

The importance of this method lies in the fact that peracetic acid can be prepared almost instantly at the site of operations by simply passing hydrogen peroxide and acetic acid over a stationary catalyst bed. This process can be operated continuously or batchwise and avoids the higher costs, handling and storage difficulties and certain hazards usually involved in using peracetic acid. And it's a good method of obtaining peracid free of mineral-acid catalysts, without needing a separate neutralization step.

When requiring peracetic acid for an organic oxidation, the chemist simply adds a mixture of glacial acetic acid and "Albone" hydrogen peroxide to a column containing about 3 inches of solid catalyst. The column consists of a 1" x 12" jacketed inner tube fitted with a sintered-glass filter and an ordinary stopcock. Adjusting the flow of effluent at 40°-45°C. through the stopcock to give contact time as low as 15 minutes allows maximum conversions to peracid.

A flow diagram showing how this unit might be operated on a larger scale is depicted above. Peracetic acid obtained by operation of such a unit can be used in many organic reactions. A glance at the box at left will give an indication of the number of reactions utilizing hydrogen peroxide in the form of peracid.

Send for booklet about the preparation of peracetic acid from hydrogen peroxide. Du Pont technical specialists—backed by a new, fully equipped Sales Technical Laboratory—will be glad to help you in your use of Du Pont "Albone" hydrogen peroxide in organic synthesis. Just write to:

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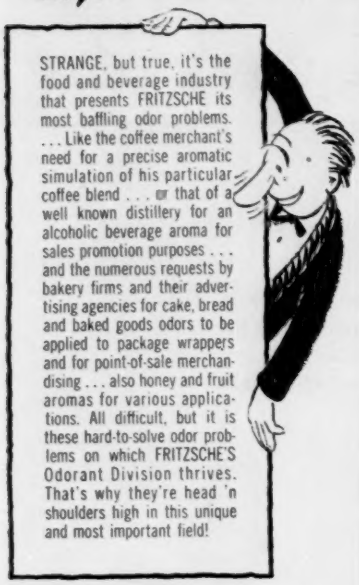

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business in '60, compared with '56 sales.

How do housefurnishings outlets for plastics compare with others in growth potential? That depends on whose opinion you seek. This fact is revealed in a just-released report of an industry survey conducted by The Society of the Plastics Industry. Companies queried were exhibitors-to-be at the forthcoming Eighth National Plastics Exposition, Nov. 17-21, at Chicago International Amphitheatre.

SPI found that manufacturers of plastics products most frequently listed furniture outlets and automotive uses as growth industries; also listed—but by fewer firms—were appliances, housewares, textiles.

Manufacturers of the dies, tools and machinery used in plastics fabrication rated growth potential of housewares and appliances second after industrial and packaging uses; they put furniture further down the list.

Raw-materials manufacturers put industrial, packaging and automotive applications first, building, appliances, housewares second, and mentioned furniture outlets and other markets less frequently.

Textile Switch: Consumption of man-made fibers in home furnishings increased impressively in the past two decades—at the expense of wool and cotton. In 1937 a total of 1.025 billion lbs. of fibers went into home furnishing uses. Of this, about 2.5% or 25.6 million lbs. were synthetics. By '57 the total home furnishings market for fibers had increased to 1.66 billion lbs., of which 18.2%, or more than 300 million lbs., were synthetics *(CW Report, March 8)*.

Most rugs and carpets are still being made of wool or of rayon and acetate. But use of these fibers is steadily declining; for example, wool consumption in '56 was 163 million lbs.; in '58, an estimated 140 million lbs. Rayon and acetate consumption for rugs and carpets declined from 114 million lbs. in '56 to a probable 109 million lbs. in '58.

Demand for cotton in manufacture of rugs and carpets has also declined steadily, from 44 million lbs. in '56, to an estimated 29 million lbs. in '58. Use of noncellulosic man-made fibers is on the upswing, although the total volume consumed is still relatively small. Some 8 million lbs. were used in '56, an estimated 32 million lbs. will probably be used this year.*

Far more pronounced is the growing demand for synthetic fibers in manufacture of blankets and blanketing. In fact, more of these products were made of synthetic materials in '57 than from cotton and wool combined. Estimated demands: wool, 20 million lbs.; cotton, 35 million lbs.; rayon and acetate yarn, 3 million; rayon and acetate staple, 39 million; and noncellulosic fibers, 11 million.

Particularly significant is the rapidly growing demand for noncellulosic synthetics—although less than 1 million lbs. were needed in '51, an estimated 11 million lbs. in '57.

In the curtain market, textile materials that have best "no-iron" properties will enjoy a big competitive advantage. The 81 million pairs of window curtains (excluding lace) made in '56 required 40 million lbs. of fiber. The estimated potential for no-iron curtains, according to curtain retailers, is 50% of this amount, or 20 million lbs.

Use of glass fibers in household applications is growing steadily—especially in fabrication of curtains and draperies. Some 5 million pairs of glass draperies were sold in '57, according to one industry estimate.

(Another fast-growing outlet for glass fibers is, of course, manufacture of reinforced plastics; the market potential is enormous; as furniture designers move toward more widespread use of reinforced plastics in such applications as chairs, drawers, cabinets. In all, growth of the glass fiber industry has already been spectacular; production increased by 655% in the past 12 years, climbed close to 110 million lbs. in '57. One estimate of glass fiber demand in '75: 600 million lbs./year [*CW, April 2, p. 60*]).

Foams Expand: Foamed materials of various types are finding expanding markets in home furnishings applications such as mattresses, pillows, furniture upholstery. Pushed ahead hard are the urethane foams; consumption by the bedding industry alone will hit 2 million lbs. in '58 and a likely 15 million lbs. by '60, according to one industry estimate.

Another urethane producer sees the market this way: In '57 some 20 million lbs. of urethane foam were consumed for cushioning, and a 100-

*Estimated fiber consumption for rugs and carpets excludes backing fibers.

Ramon A. Mulholland discusses properties and potential uses of the

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"of special interest are their bacteriostatic, fungistatic and surface-active properties. They've been patented as gasoline additives, polymer components, stabilizers for aromatic amines"

Ramon A. Mulholland, B.S., M.S., Indiana University
Manager, Marketing, Callery Chemical Company

Q. Mr. Mulholland, are these materials bacteriostatic or fungistatic?

A. Both. Screening tests show that Nonyl Boric Acid completely inhibits growth of three bacteria and three molds in dilutions as high as 1:25,000 and has some effect even at 1:1,000,000. Dodecyl Boric Acid was active against four of these common microorganisms.

Q. Can polymers be made from the Alkyl Boric Acids?

A. Polymers prepared from organosilanediols and Alkyl Boric Acids have been patented. Other copolymers should be possible.

Q. Are these materials stable at high temperatures?

A. The Alkyl Boric Acids tend to lose water and form cyclic anhydrides known as boroxins. These oil-soluble trialkyl boroxins have been suggested as components of oil additives for stabilization against oxidation and polymerization.

Q. How about the present and future availability of the Alkyl Boric Acids?

A. At present, Nonyl and Dodecyl Boric Acids are obtainable in research quantities, with production of larger quantities at Callery's Lawrence, Kansas Plant to follow.

Q. Can other Alkyl Boric Acids be made?

A. Various Alkyl Boric Acids can be made with different alkyl, cyclic, and functional groups. If you expect that a particular compound might have the right properties for your product or process, we would like to hear from you.

Q. Are the Alkyl Boric Acids like the silicones in any way?

A. They appear to bond to glass surfaces in a manner similar to the silane diols. For instance, the glassware in which the bacteriological tests were made had to be carefully cleaned to permit further testing.

Q. Are these materials stable to hydrolysis?

A. Nonyl and Dodecyl Boric Acids appear to be quite stable to either acid solutions or alkaline aqueous solutions.

Q. What industries might use these acids?

A. In the manufacture of paper for control of slime organisms. In paint, leathers, and polymers to minimize bacterial damage. In the oil industry as petroleum additives, and many others.

Write or phone for specific information on the Alkyl Boric Acids

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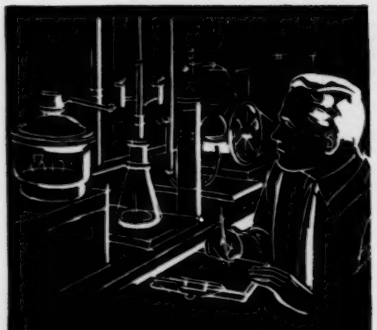

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MARKETS

million-lbs./year demand is foreseen for '60. The '60 demand breaks down this way: automotive uses, 40%; bedding, 15%; furniture, 30%; carpet underlay and miscellaneous, 15%.

Phone Outlet: In some house furnishing applications, the use of chemical products has become so well accepted that their importance is easily overlooked. Case in point is the modern telephone.

Most obvious plastic components in telephones are, of course, the molded cellulose propionate housing and hand parts. But many other hidden components are also plastic—cast acrylics, extruded polyvinyl tubing, or phenolics, polystyrene and nylon.

Electrical networks of telephones, for example, are "potted" or embedded in polyethylene-polybutene. And the telephone industry extols the virtues—especially performance and economy—of polyethylene cable coverings.

How much plastic goes into the nation's telephones? A nationwide estimate isn't available, but Western Electric says it alone consumes more than 9 million lbs./year to make telephones for the Bell System (Bell accounts for some 80% of the total U. S. telephone business).

The Bell System installed 2,126,000 main telephones and 1,042,000 extension telephones in private residences in '57. This figure, which leaves out business phone installations, compares with an annual gain of about 1.5 million main units and 288,000 extension phones in the early '50s.

Now that the convenience of a kitchen extension is well sold to the consuming public, the Bell System (AT&T) will start a big promotional push next month to sell the idea of another extension in the bedroom. To chemical makers, this, of course, potentially means still bigger markets for a host of products.

The list of chemical products used to fabricate home furnishings could be extended virtually indefinitely, would include a host of inconspicuous but vital materials that go into appliances, radios, TV sets, tape recorders, etc. Significant is the fact that such former luxury items are now increasingly viewed by home makers as near-necessities, and this trend spells a steadily expanding demand for more and varied products of the chemical industry.

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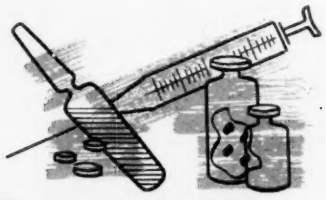

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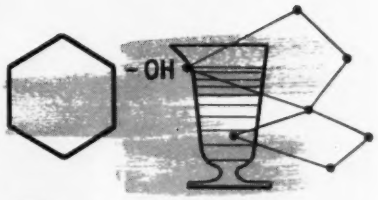

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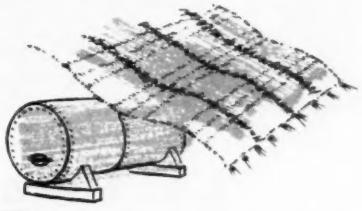

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Nickel Carbonate — Nickel Formate — Nickel Nitrate
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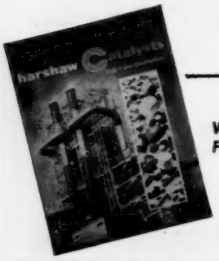

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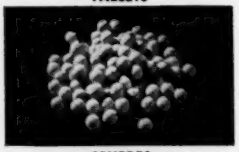
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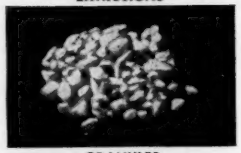
GRANULES

POWDERS

FLAKES

Market Newsletter

CHEMICAL WEEK
September 20, 1958

An advance notice of sharp price cuts on anhydrous ammonia was posted last week by Best Fertilizer (Oakland, Calif.).

During the '59-'60 off-seasons (August-December), Best's anhydrous ammonia will sell for $63/ton f.o.b. at the firm's abuilding 40,000-tons/year plant at Lathrop, in California's fertile Central Valley—where a second ammonia plant may soon be built. In the '60 on-season period (January-July), price will be $68/ton. By comparison, current West Coast price of anhydrous ammonia is $88/ton.

Reaction of other producers to Best's move: "Let's wait and see."

•

Polystyrene is in production at Granada Plastics' plant at Saugus, Calif. Shipments will likely start this week, first to southern California buyers, then to Midwest markets. Spokesmen confirm capacity of the plant is 250,000 lbs./month (*CW Market Newsletter, Aug. 2*).

The venture is being launched with help of a new credit policy, which offers 2% discount for payment in 10 days (most producers offer terms of net 30 days). Granada will have a base price of 23-24¼¢/lb.; competitive producers offer the resin at 24¼¢/lb.; still others quote 20-23¢/lb.

•

U.S. output of foamed plastics will climb to well over 50 million lbs. in '58 for a 59% gain over the 31.5 million lbs. produced in '57. The near-19-million-lb. gain is several million more than was scored in '57, although the '57-over-'56 percentage gain was greater.

These estimates, by Joseph Morton, newly elected chairman of the cellular plastics division of The Society of the Plastics Industry, also include a breakdown for '57 by plastic types: flexible and rigid vinyls, 4.5 million lbs.; flexible and rigid urethanes, 12 million lbs.; rigid polystyrene, 15 million lbs.

Increasing use of foams in furniture (*see also p. 81*), transportation equipment and a host of other applications will boost production in '58: of vinyl, to more than 5.2 million lbs.; of urethane, to 25 million lbs.; of polystyrene, to 20 million lbs.

•

Prices of cyclohexanol and cyclohexanone are boosted 2¢/lb. by Du Pont's Polychemicals Dept., effective Oct. 1. Rising freight and manufacturing costs are cited as reasons for the increases.

This brings price of Du Pont's cyclohexanol, tradenamed Hexalin, to 26¢/lb. in tank-car quantities, delivered in all states east of Montana, Idaho, Utah and Arizona. Tank-car price of its cyclohexanone, tradenamed Hytrol, is now 31¢/lb. in the same delivery zone. Prices of both are 1½¢/-lb. higher in the Far West. And available for the first time are tank-wagon

quantities—2,000-gal. minimum—of these materials from agents, stock only, at ½¢/lb. above tank-car prices.

•

A 4¢/lb. cut in price of Bakelite's wax polyolefin DYDT brings its cost to 35¢/lb. DYDT is used to upgrade paraffin and microcrystalline waxes for coating paper and paperboard.

•

Now firm are the long-anticipated new prices of wood rosins. As predicted (*CW Market Newsletter, Sept. 6*), Hercules Powder's Naval Stores Dept. has posted these prices. Effective Oct. 1, 100-lb. quantities in carloads, f.o.b. producing plant: grades K and M, $7.80; grade N, $7.90; grade WG, $8.25; grade WW, $8.60.

And prices of all grades of rosin size—both pale and dark—shipped from Hercules Powder's Northern plants are reduced slightly. The cut reflects elimination of a 3% federal transportation tax.

Southern prices of these materials will remain unchanged in the fourth quarter of '58, says the firm's Paper Makers Chemical Dept.

•

Production of epoxidized soybean oil will start this fall at General Mills' new facilities at Minneapolis. The product is used as plasticizing stabilizer for polyvinyl chloride resins. Productive capacity of the unit is not revealed; initial output will come from an interim unit, but provision has been made for expansion.

•

Foster Grant has started production of a nylon molding material under license agreement with Germany's Farbenfabriken Bayer. The material, tradenamed Fosta Nylon 62 ASK, is being made along with regular nylon formulations at the firm's new multimillion-dollar Manchester, N.H., plant. Big plus of the now-available product: "injection molding cycles can frequently be reduced as much as 20-40%."

•

Consumption of polyisoprene "natural synthetic" rubber may hit 150,000 tons/year by '65, R. P. Dinsmore, vice-president of Goodyear Tire & Rubber, told the Congress International de Chemie Industrielle in Liege, Belgium.

Dinsmore predicted a large surplus capacity of styrene-butadiene type of synthetic rubber in the Americas, a moderate excess in eastern Europe, and a shortage in western Europe. Increased capacity in the Americas will come from new facilities in Central and South America and from polyisoprene plants in the U.S. and in Canada.

These additional synthetic-natural rubber plants, says Dinsmore, "will banish the specter of a natural rubber shortage." A dearth of supply had been predicted up to a few months ago. Any fear of such a shortage, he says, could be scotched by "acceleration of the current *cis*-polyisoprene or natural-synthetic rubber development."

This new packaging idea dominates a $70,000,000 market

Introduced just four years ago, aerosol-packaged colognes now account for more than half of total cologne sales. Aerosol packaging has taken command of this $70,000,000 market and has also revolutionized sales for hair fixatives, shave creams, insecticides and a host of other products.

Sales records and marketing data prove the appeal of aerosol packaging. In a recent market survey, housewives who tried aerosol cologne preferred it 6 to 1 over any other form. The reason: aerosol cologne is easier to use and apply, and there is no waste or evaporation.

If your product can be brushed, poured or sprayed, you stand a good chance to add new appeal—create a positive competitive advantage—if you packaged it in an aerosol.

It's surprisingly simple and inexpensive to put the unique advantages of aerosols to work for you. A custom filler near you has the specialized knowledge and equipment to help you. He can package your formulation for testing and help you from planning through production.

* * *

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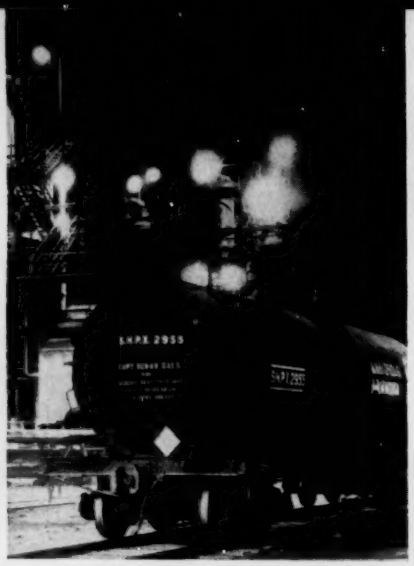
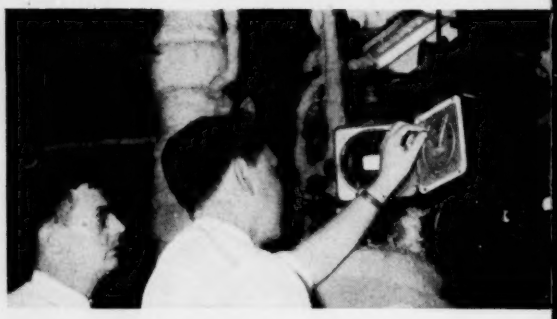
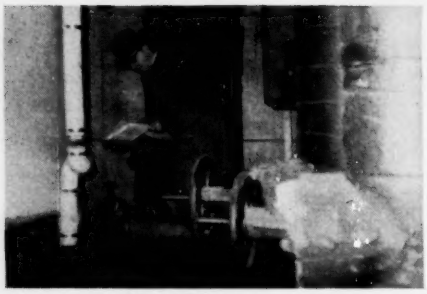


Metallurgical company—Called in to help settle a debate between plant engineers and safety department about where to put a large NH_3 tank, Herb Kerr's experience helped influence final decision. Later Kerr put in a 16-hour day helping to unload first tank car and get equipment running properly.

Big chemical company—Problem: to recover NH_3 used as a solvent. Although customer preferred not to reveal full details of process, Kerr and George Cleek, Allied specialists, were able to devise for them an economical method for purification and recovery.



New manufacturer—Wanted to make household ammonia. Needed help to get started. Kerr conferred with Gar Ellis on laboratory test before suggesting equipment and recommending a supplier of an additive which was known to give the right degree of cloudiness.



Chemical specialty company—Small, new at using NH_3. Bought some war surplus tanks, ran into problems, called Allied. "Zeke" Sziklas responded. Checked equipment they had, recommended additions, lined up contractor to install.

Paper mill—was considering ammonium bisulfite pulping. Allied worked out complete plans for NH_3 equipment required. Herb Kerr checked with "Westy" Westlake of engineering research before proceeding on trip to be on hand at startup—and for another three days—to make sure operations would continue smoothly.

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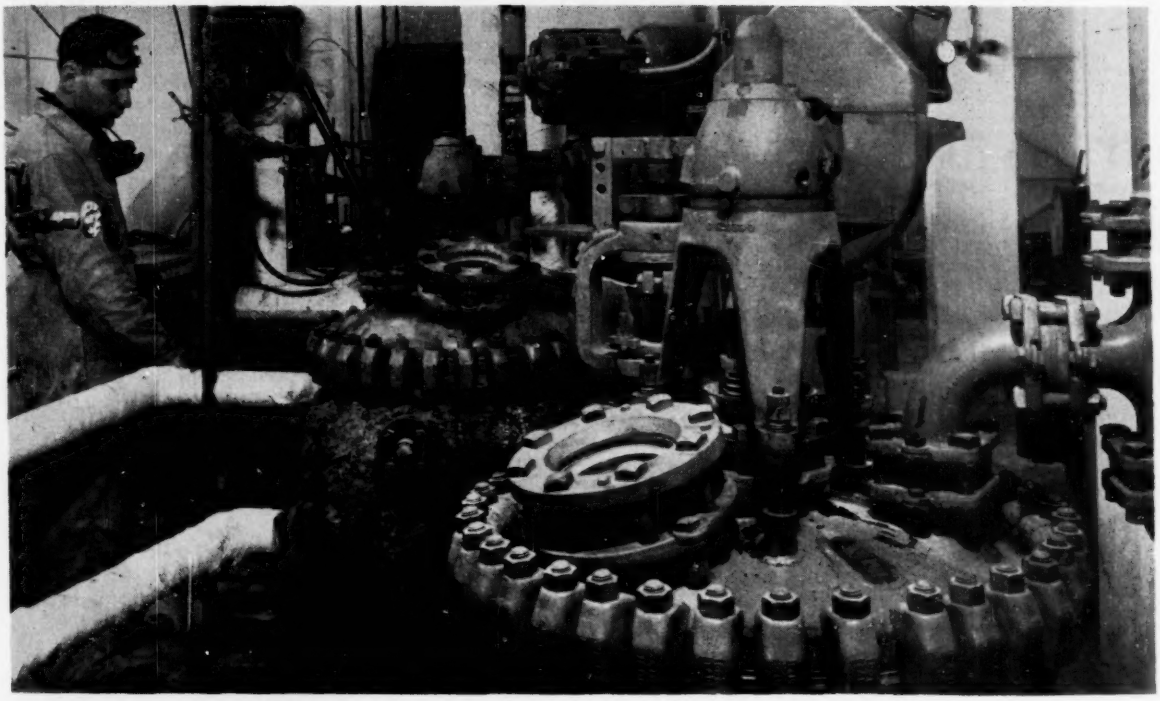

Two 20-gal. reactors at Technion turn out experimental castor-oil-derived plasticizers.

Israelis Eye New Chemical Frontiers

What is the basis for the surging growth of Israel's chemical industry, which now produces goods at a $55-million/year* pace after only 10 years of existence? A solid foundation of research, says David Ginsberg, chairman of the Dept. of Chemistry at Israel's Institute of Technology (Technion), who last week outlined to CW his nation's bid for process companies as well as scientists.

Ginsberg has been in the U.S., recruiting manpower to strengthen Israel's research program. In describing his nation's needs, he says that, to date, research in Israel has been accomplished predominantly by two groups: staffers and students at Technion (both academic and contract work) and by government labs.

Industrial research, relatively small in the over-all picture, has progressed slowly due to two shortages: scientific manpower and money. Ginsberg's mission here was to help alleviate the problem.

*Israeli government estimate.

He was after top chemists and engineers to go back to Israel with him as teachers and researchers at Technion. At best, Ginsberg claims, "Israel can produce only 85 chemists and 50 chemical engineers each year at Technion and Hebrew University, our only sources of supply — and this puts us about five years away from estimated needs." But, at least, an end to the manpower drought is in sight.

Ginsberg feels that in spite of the present manpower shortage Israel offers a good opportunity for U.S. companies to build labs and plants for the Mideast and African markets. The research "climate" is good and the scientist shortage should end soon, he says.

But he admits that so far few U.S. or other foreign firms have invested much in Israel, fearing war, although he feels that the war fears have been overplayed. Also, he notes, Israeli government funds have been tied up in public works projects and care of the steady influx of refugees the nation continues to receive each year.

Practical Approach: How, then, has Israeli chemical industry progressed at so quick a pace — considering the lack of funds and trained personnel? Ginsberg frankly credits the high quality of the government and university research. Emphasis in research and production has been on optimum utilization of available materials and on creating new products requiring minimum of raw material imports. This follows the scheme of the late Chaim Weizmann, a world-known chemist, who was the first president of Israel. His idea was to build up industries, such as pharmaceuticals and fine chemicals, that had excellent profit potentials.

Today, Ginsberg says, Israel's CPI and its research aims are in this direction:

In the main, the chemical industry is inorganic. The Dead Sea is one of the world's greatest potash and bromine sources. It is being exploited by Palestine Potash Co. (one of the few private firms doing research),

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The Century Brand Oleic Acids pictured above have the following properties:

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Maximum color, Lovibond	5Y/0.5R—5¼"	15Y/3R—1"
Acid value	197—203	195—201
Saponification value	198—205	197—203
Unsaponifiable content	1.5% max.	2.0% max.
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We would like you to see our Oleic Acids and compare them critically with other competitive products, so you may fully appreciate Century Brand quality. We invite your comparison of Century Brand Oleic Acids because only you can realize their advantages in *your* products.

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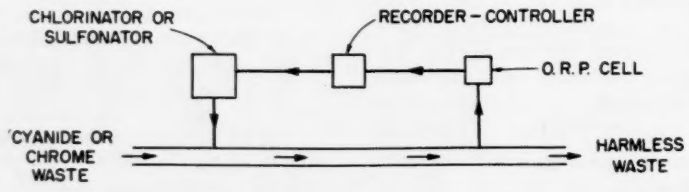

An oxidation-reduction potential cell, monitoring treated waste provides the signal for recording and controlling treatment chemical quantities in a typical W&T waste treatment system.

For Full information on Industrial Waste treatment write Dept. I-66.24

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In Canada, Wallace & Tiernan, Ltd. — Toronto

whose aims include expansion of the applications of bromine in place of the other halogens in products such as insecticides.

Most of the chemical industry, however, pivots around the Haifa Bay area, Israel's leading seaport. Israel Electrochemical Industries has just built a chlorine and caustic plant there. Competitors are Frutarom Electrochemical Industries Ltd. (backed by government and private Israeli and U.S. capital) and Makhtheshim facilities in Beersheba (owned by the labor organization, Histadrut).

Fertilizers & Chemicals Co. (Haifa) is putting out sulfuric acid, superphosphates, ammonia and other high-

GINSBERG: 'In a barren country, fertile areas for chemical research.'

tonnage inorganics. Israel Mining Industries, Ltd., working under the government's Ministry of Development, is researching (and in some cases producing economically) copper, manganese and mica. Pharmaceutical makers, although numerous, have little money for research or expansion and have remained relatively stagnant. Israel's drug industry is small by international standards.

Much applied organic research is now getting under way at Technion. The flow of petroleum to the huge Haifa refinery was cut off several years ago by Iraq Petroleum Co., but recent petroleum finds in Israel have spurred petrochemical research anew. One small producer, Kadimah Chemical Co., is turning out detergents from fuel oil; it uses a catalytic oxidation process.

Other substantial research projects

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

Sept. 20 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1958

Aliphatic Dinitriles And Diamines Prepared From ISOSEBACIC® *Acid*

A new method of synthesizing aliphatic dinitriles and diamines — some of them believed to be new compositions of matter — is described in U.S. Patent 2,824,118, recently issued to U.S.I.

ISOSEBACIC acid is reacted with ammonia and/or urea or other nitrogen-containing compounds to form a mixture of C_{10} dinitriles. They are primarily sebaconitrile, α-ethylsubero-nitrile and α,α'-diethyladiponitrile.

The nitrile mixture can then be hydrogenated in the presence of ammonia and a catalyst to yield C_{10} diamines. They are a mixture of decamethylene diamine, 1,8-diamino-2-ethyloctane and 1,6-diamino-2,5-diethylhexane.

The dinitriles are considered valuable as chemical intermediates, and for solvents, lubricants, plasticizers and textile water repellants. The diamines should be useful in the synthesis of various types of polyamides — particularly fibers — and in plastics, rubbers, plasticizers, synthetic lubricants, polyurethanes and other products.

Nutritional Dystrophy Studies Show Lower Methionine in Blood

It has been reported that determinations of methionine in the blood of children with nutritional dystrophy average considerably below normal. In a study of whole blood from malnourished and normal boys, methionine content was found to average 73 mg. lower in the first group (331 ± 16 mg. as against 404 ± 16 mg. for the normal group). Determinations on the serum alone did not reveal a similar variation.

It was felt by the investigators that low values in the whole blood of the malnourished children might be due to hypochromic anemia prevalent in the group.

390 Million Nonfood Aerosols Sold in 1957

The Chemical Specialties Manufacturers Association estimates that 390 million nonfood aerosol units were produced in 1957, based on 339 million units reported in their survey and adjusted for companies not responding. Here's how the report looked, in millions of units:

Hair Sprays	94.4
Shaving Lather	50.9
Room Deodorants	41.9
Insect Sprays	41.5
Coatings	36.5
Colognes and Perfumes	17.9
Household Products Other Than Room Deodorants and Glass Cleaners	16.9
Personal Products Other Than Shaves, Hair Sprays, Colognes & Perfumes	12.3
Glass Cleaners	11.2
Miscellaneous	15.6

New Roles Seen for Ethanol in Medical & Pharmaceutical Fields

Recent Developments Include New Nerve Block Application, And Improvement of Ruminant Nutrition

Medical and biochemical research on ethyl alcohol — best known as a solvent — is constantly revealing new facets of its personality. It is evident that ethanol has *many* modes of action—physical, chemical and biological — that are important to the doctor, the nutritionist and the producer of pharmaceuticals.

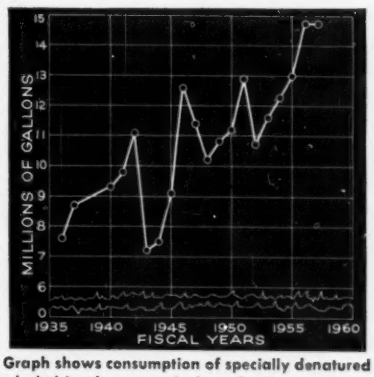
The practical use of ethanol in medicine as a nerve block agent is increasing. A few months ago a team of radiologists and neurosurgeons revealed a method of treating the painful facial *tic douloureux* by radiologically controlled injections of absolute alcohol. Forty-five patients so treated experienced immediate relief of symptoms, it was reported, although several had to be retreated, and one finally had to undergo the usual surgery.

New Function in Microbiology

Fermentation processes utilize several of ethanol's well-known modes of action—solvent, carbon source for yeast growth, and nutrient raw material for bacterial conversion into other chemicals.

And now, within the last year, a patented* novel use of ethanol in fermentation has begun to revolutionize the ruminant feed industry. It has been discovered that alcohol ingestion by cattle and sheep accelerates rumen microflora metabolism, by acting as a hydrogen donor. Ethanol has the unexpected property of maintaining a low oxidation-reduction potential in the rumen. This allows greater utilization of natural feeds rich in cellulose, and enables the micro-organisms in the rumen to make better use of nonprotein nitrogen materials such as urea. The microfloral cycle is

MORE



Graph shows consumption of specially denatured alcohol in pharmaceuticals and toiletries.

Sources: (a) STATISTICS ON THE USES OF SPECIALLY DENATURED ALCOHOL, Internal Revenue Service (data for 1936-1937 and 1940-1957). (b) ANNUAL REPORTS OF THE COMMISSIONER OF INTERNAL REVENUE, Internal Revenue Service (data for 1938 & 1939).

Heterocyclic, Homocyclic Systems Made by New Route

Research chemists have discovered that heterocyclics and homocyclics can be synthesized by an entirely new method. Potassium amide is reacted with the starting material to form a benzyne intermediate with a nucleophilic center. Nucleophilic means "seeking an electron-deficient group." In the presence of liquid ammonia, this center then adds intramolecularly to give a closed-ring compound.

Indane, indole, 2-phenylbenzothiazole, benzoxazole and phenothiazine have all been made by this new technique, and the research group believes it can be used to prepare many other hetero- and homocyclic compounds. Both five- and six-membered rings have been formed, all through intramolecular addition of nucleophilic sulfur, oxygen, nitrogen and carbon.

Stauffer's $TiCl_4$ Plant Bought by Mallory-Sharon

Stauffer Chemical Company's new 50 million pound-per-year titanium tetrachloride plant at Ashtabula, Ohio has been purchased by Mallory-Sharon Metals Corporation, which in turn is one-third owned by U.S.I. The new acquisition completes the company's integration of facilities for producing titanium — from ore to finished mill products.

New Method for Making Glycidyl Esters

The glycidyl esters — important as perfume and flavor ingredients, and in vinyl plasticizers, stabilizers and resin intermediates — can now be synthesized by using sodium hydride in oil as the condensation reagent in the Darzen condensation reaction.

When employed together with a ketone and a chloroacetate acid ester, NaH in oil is reported to give excellent yields in short reaction times at room temperature, with little or no side reaction.

NaH in oil is a 50% dispersion of 2-25 micron particle size crystals in an inert white mineral oil. It is handled as a solid which can be fed directly into reaction vessels either mechanically or by hand.

NaH in oil is prepared from dispersed sodium and hydrogen at 190-225°C. Its preparation is described in U.S.I.'s brochure "Sodium Dispersions," available on request.

Sept. 20 ★ **U.S.I. CHEMICAL NEWS** ★ 1958

CONTINUED *Ethanol*

accelerated, thus increasing the daily rate of protein synthesis and cellulose digestion.

It is thought that this new role for ethanol may find application in other fermentation processes allied with the manufacture of pharmaceuticals and biologicals.

Ethanol Is a Surfactant

Ethyl alcohol is being used as an antifoam to relieve pulmonary edema in humans which sometimes occurs immediately after surgery. Under such conditions foaming in the lungs interferes with oxygenation. Inhalation of 95% alcohol vapor modifies the surface tension of the fluid and reduces the amount of foam in the lung. It is reported to produce immediate and dramatic recovery in most medical cases.

Protective Action in Body

Data is continually being compiled on the action of ethanol as a protective agent in the body. Organophosphate compounds, such as chemical warfare nerve gases and some agricultural insecticides, are known to act by inhibiting the formation of serum cholinesterase by the organism. It has recently been discovered, that ethanol protects against this inhibiting action.

Animal experiments have shown that preadministration of ethanol gives considerable protection against radiation sickness.

Role in Body Metabolism

In the human body, moderate doses of ethyl alcohol have been found to exert a protein-sparing action—improving protein storage and growth. And it has been reported that a positive nitrogen balance is more easily maintained in human convalescence when glucose and amino acids are supplemented with ethanol. Studies on animals show that ethanol also helps mobilize vitamin A from storage depots in the body.

The roles of ethyl alcohol as a vasodilator, as a stimulant, and as an antiseptic and disinfectant are well known, but should be mentioned here to round out the perspective on this U.S.I.-produced compound — one of the most versatile and valuable chemicals the medical and pharmaceutical fields have at their disposal today.

**U.S. Patent 2,808,332 — Anderson and Rapp*

U.S.I. Tank Car Domes Now Color-Coded for Product

The entire U.S.I. fleet of 900 tank cars is being repainted black on light gray, with the traditional U.S.I. oval in black and red. Inherent in the new design is a color-coding system that immediately identifies the type of service for which tank cars are used. Domes of the tank cars are painted any of the following identifying colors:

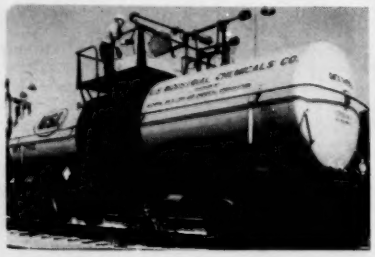
Solid Domes

General Service (alcohol, etc.)	White
Ethyl Ether	Light Blue
Chlorine	Light Green
Ammonia	Bright Yellow
Sulphuric Acid	Black
Phosphatic Fertilizer Solution	Bright Orange
Nitrogen Fertilizer Solution	Bright Red
Caustic Soda Cars	Maroon
Metallic Sodium	Gray

Black Domes with 4 Inch Color Stripes

Ethyl Chloride	Black with Orange
Olefin	Black with Yellow
Miscellaneous gasoline, waste material	Black with Red

This new color-coding system provides U.S.I. with a double check — an at-a-glance opportunity to pick up errors before cars reach the loading rack.



Black, light gray and color-coded dome combine to give new look to U.S.I. tank car fleet. Overall design was chosen to give company identity, dome color to give product identity. Here a newly painted U.S.I. Alcohol tank car with identifying white dome is loaded at Tuscola, Ill.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

N-meta-tolyl phthalamic acid has been discovered to increase plant yields by reducing shock and stress of heat, cold, long rains and drought. Material has been test-sprayed on limas, cotton, cherry trees. **No. 1390**

New booklet on polyethylene film, coatings and molded items for packaging field illustrates advantages of material in terms of economy, sales appeal, protection of product and convenience. **No. 1391**

Zone-melting purifier for organic compounds now on market. Claimed to permit preparation of hyperpure solids in laboratory through slow travel of ring heater up along glass tube containing solid. Impurities concentrate at top. **No. 1392**

New insect repellent, diethyltoluamide, is said to be most effective ever developed for mosquitos, fleas, ticks, chiggers, deer flies. Product now being made with 95% minimum meta isomer content. **No. 1393**

Rare books on science and medicine which can be purchased are listed in new catalog which includes 258 works, alphabetically by author. Catalog covers only a portion of books available. Lists works printed from 1485 to 1929. **No. 1394**

A new aluminum hydroxide-magnesium carbonate co-precipitate dried gel is being sold which, it is claimed, will permit antacid producers to market tablets and powders with the same therapeutic value as the usual liquids. **No. 1395**

Series of ultrasonic units — mass-produced, low-cost, laboratory-size — has been developed for cleaning small delicate parts or assemblies, glassware, apparatus. Also suggested for biological, medical, chemical studies. **No. 1396**

2-Carbethoxycyclopentanone is now available commercially for pharmaceutical and fine chemical applications. Is precursor for many 2-substituted cyclopentanones. Enters into variety of reactions typical of beto-ketoesters. **No. 1397**

3-Sulfolene and some derivatives can now be obtained in research quantities. It is a controlled source of pure sulfur dioxide. As an intermediate, it reacts with chlorine, water, ammonia, alcohol and mercaptans. **No. 1398**

Odor-metering apparatus and techniques for its application to industrial odor-control problems are described in new 4-page brochure. Odor meter measures subjective impressions, must be operated by experienced personnel. **No. 1399**

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now going on: in the field of agricultural wastes (monomers have been produced from waste olive pulp); paper production from corn stalks; citrus fruit by-products; and nuclear power (Israel's first atomic reactor is now in operation).

On these projects rest the nation's hopes for further industry. It is a situation considerably different from that in the U.S., notes Ginsberg—in the U.S., the general scheme of things has been to create big industry first, then improve and expand product lines by research. But, he adds, "Israel is relatively barren and must be initially creative."

Some U.S. companies, such as General Tire and Beaunit Mills (the latter is building a $20-million rayon plant in Israel), have already decided to participate in the Mideast's future by building in Israel.

EXPANSION

• International Minerals & Chemical Corp. has formally opened its $5-million administrative and research center in suburban Skokie, Ill. A feature of the center is a heliport atop the administration building, one of the few private ones.

• Weyerhaeuser Timber Co. (Tacoma, Wash.) has realigned its Longview, Wash., research facilities to form a central research and development organization. Its staff will explore uses for wood-derived chemical products and provide technical services to customers.

• Research Specialties Co. (Berkeley, Calif.) has established a chromatographic materials department. It will offer consulting services and supply materials necessary to run tests.

• The Texas Co. (New York) has completed a radiation research laboratory at its Beacon, N.Y., location. Plans are to probe the atomic structure of petroleum and its derivatives, using four radiation sources—electrons, positive ions, gamma rays and neutrons.

• Sinclair Research Laboratories, Inc. (Harvey, Ill.), has established a research office in Detroit to maintain closer research liaison with the auto industry.

• Dow Chemical Co.'s Texas Division (Freeport, Tex.) has set up a new marine biochemical laboratory to develop chemicals for control of the marine borers *Limnoria*, a crustacean variety, and *Teredo navalis*, sometimes called the shipworm. V. B. Volkening heads the new research team. Objective: a compound insoluble in sea water, suitable for blending with commercial preservatives, that will kill the marine borers but not harm human beings. Marine borers cause an estimated $50-million damage yearly (*CW, June 8, '57, p. 72*).

• Research and development personnel of Nuclear Development Corp. of America (NDA) are moving into new facilities in the Eastview section of Westchester County, New York. NDA's laboratories at Pawling, N.Y., are also undergoing expansion.

• The U.S. Dept. of Agriculture plans to change the location of two tung research laboratories operated by its Agricultural Research Service. Tung oil utilization research will be shifted from Bogalusa, La., to New Orleans, La., about Oct. 1. Facilities and staff of the Gainesville, Fla., field laboratory for tung production investigations will be transferred to Bogalusa around early '58.

PRODUCTS

Aromatic Acid: Trimellitic anhydride is now available in developmental quantities from Amoco Chemicals Corp. (Chicago). It is said to offer special advantages in preparing alkyd resins, unsaturated polyesters, printing inks, resin intermediates, adhesives, molding resins, plasticizers, dyes, etc.

•

Analytical Aid: Reagent-grade mercuric chloranilate is now available from Fisher Scientific Co. (Pittsburgh) for determination of chloride. Price: $4.25/10 g.; $8.95/25 g.

•

Amine Entries: A new group of ethylenediamine derivatives is now offered by The Ames Laboratories, Inc. (South Norwalk, Conn.). They're for research in pharmaceuticals, corrosion inhibitors, and for study of catalysts for polymerization of urethanes, and other plastics. Included: N,N′-dimethyl-N, N′-diethyl; N,N-dimethyl-N′,N′-diethyl; N,N,N′-triethyl; N,N-dimethyl-N′-ethyl; N-methyl-N,N′,N′-triethyl; and N-ethyl-N,N′,N′-trimethyl ethylenediamines.

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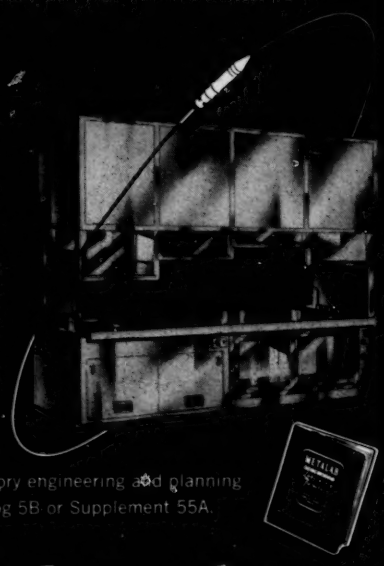

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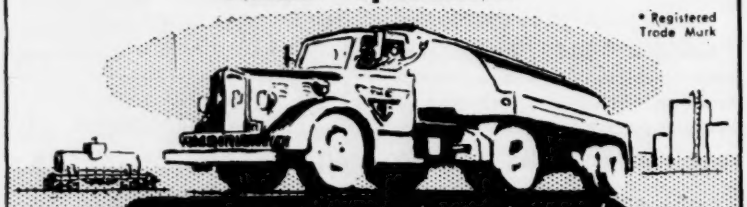

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RESEARCH

Mann Research Laboratories (New York). Cost is said to be appreciably lower than the product isolated from natural sources.

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Plating Chemicals: Molybdenum hexacarbonyl, tungsten hexacarbonyl and tungsten hexachloride are now being produced in semiworks quantities by Climax Molybdenum Co., a division of American Metal Climax, Inc. (New York). Potential applications include vapor-phase deposition of the metals (*CW, July 26, p. 62*), catalysis, and as chemical intermediates.

LITERATURE

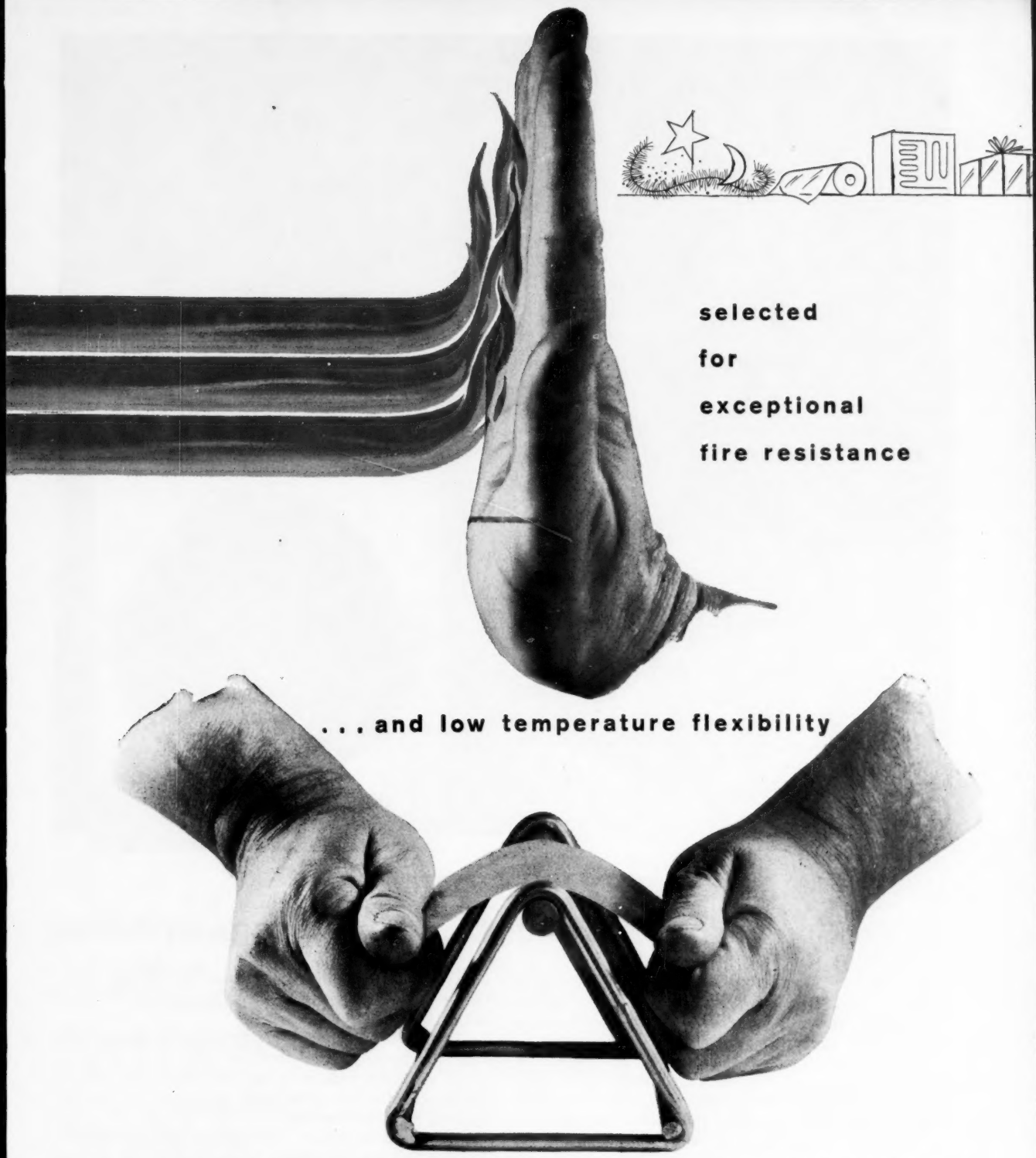
• The Department of Professional Services of Warner-Chilcott Laboratories, Morris Plains, N.J., is now distributing (free) a monthly called "World-Wide Abstracts of General Medicine." Excerpta Medica Foundation of New York makes these English abstracts of foreign medical journals. Although intended primarily for practicing physicans in the U.S., they may also be of interest to U.S. drug firms.

• "Research Laboratories" is a 52-page booklet listing the factors to be considered when designing and constructing a new research laboratory. It is available (free) from Wigton-Abbott Corp. (Plainfield, N.J.).

• Bausch & Lomb Optical Co. (Rochester, N.Y.) is offering instructions for five new analytical procedures that use its Spectronic "20" calorimeter: nickel by the dimethylglyoxime method, manganese by the periodate method, silicon by the silicomolybdate method, iron by the thiocyanate method, phosphorus by the molybdivanadophosphoric method. Price: $12.

• A wall chart giving an up-to-date listing of antimicrobial agents by both generic and tradenames is available (free) from Baltimore Biological Laboratory Sales Office, c/o Becton, Dickinson and Co. (Rutherford, N.J.). The chart is also a guide for *in vitro* bacterial susceptibility testing with sensitivity discs.

• "The Effect of Moisture Content on the Efficiency of Metallic Chloride Catalysts in the Dimethylol Phenol Resin Cure for Butyl Rubber" is a new bulletin (100-4C) available (free) from Thiokol Chemical Corp. (Trenton, N.J.).



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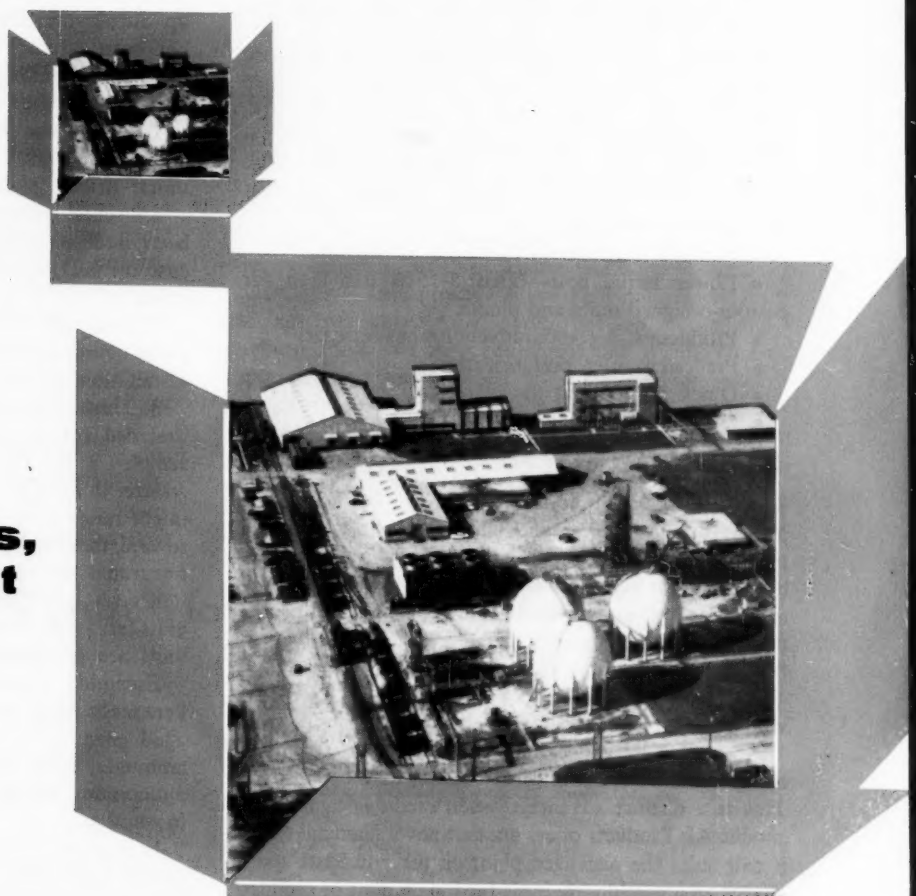
CW Report

by John J. Mahoney

CPI's new-plant builders find it's constantly getting tougher:

- **to prune the costs of design, engineering and construction.**
- **to cut the time lapse between go-ahead and start up.**
- **to meet the financial burdens of expansion.**



to find the answers, management is taking a close look at...

TODAY'S TREND TO PACKAGE PLANTS

Today's Trend to Packaged

Before top-management men give the go-ahead to any new plant construction today, they want assurance that (1) design, engineering and construction costs will be held to a minimum, (2) the time lapse between go-ahead and onstream will be as short as possible and (3) financing will be available to whatever extent is necessary to carry the project through. Today, these assurances are harder than ever to come by, especially for medium-size and small chemical processors, largely because of the growing size and complexity of highly automated and instrumented continuous-process plants.

Predesigned units—so-called "package plants," "package-plant equipment" or "package designs" may be one way out of this difficulty. Such units are gaining steadily in availability and popularity. For the first time CHEMICAL WEEK has put together in one directory a listing of available packaged units. This directory (*pp. 105-110*) is the result of surveying 357 U.S. design, engineering and construction firms. Data on the 75 different types of packaged plants shown includes principal products, number of plants built, capacities and unit prices.*

Advantage Accounting: Packaged plants offer:

- Lower initial cost—often 5-15% less than for custom-designed units and plants.
- Production at comparatively lower unit cost.
- Predesign, often prefabrication.
- Quick assembly at the plant site.
- Quick startup.
- Tested and predictable performance.

Some of these features are also available in custom-designed plants. But one of the major attractions of packaged units lies in the unusual financing benefits peculiar only to them. Financing is generally easier because banks and investment underwriters can actually see comparable units in action and can study their profit-performance records. Backers aren't asked to finance blindly.

At least one packaged-plant supplier, Air Products, will lease its equipment, rather than sell it outright. The leased plant can be "expensed"—regarded as part of a company's operating cost—rather than capitalized. This is a distinct advantage when credit is tight, as it is now. Air Products offers another novel financial twist: it will build the packaged plant on the purchaser's site charge on a commodity basis for the amount of product per unit time, plus, perhaps, some stand-by charges.

* Readers are cautioned, however, that other firms in addition to those listed supply packaged-plant equipment and designs. These suppliers, for one reason or another, chose not to disclose the data requested.

Either scheme—leasing or commodity purchasing—conserves capital. But while capital is preserved, fixed charges go up. Cost of rearranging and replacing facilities, demolition, etc., are borne by the purchaser.

Decade of Growth: Ten years ago, the number and types of packaged plants available to the chemical processing industry were sparse. Today, the list is substantially lengthy and is steadily increasing—75 types of packaged plants are included in the directory accompanying this report. Using these packages, 1,453 installations have already been built or are now being built.

Packaged plants and packaged designs aren't a new concept in the CPI. Chemical Construction Corp. (New York) claims that between 1928-58, it built close to 200 sulfuric acid plants based entirely or in part on packaged designs. Chemico makes the same claim for the 55 ammonia and 38 nitric acid plants that it put up during the same period. Since '45, the company has been offering gas-reformer packaged plants; still more recent among the newcomers are urea and methanol units.

Wrapping the Package: What are packaged plants and what makes them different from custom-designed units? Briefly, packaged plants are—

1. Actual plant or plant designs that have already been built or drawn for one or more previous CPI customers. Designs and equipment specifications already exist.

2. Noncustom units, in the sense that the indirect construction costs are spread over a number of similar installations for one or more customers.

3. Units that have been entirely or in part predesigned (often prefabricated) and can be easily assembled at the site.

Size does not distinguish the packaged plant. It might range from a relatively small pilot plant, worth several thousand dollars, to entire sections of a fully integrated chemical complex, where each packaged unit costs millions of dollars. Some smaller packaged units are skid-mounted for mobility; larger packaged units are permanent installations.

Escambia Chemical Corp.'s $30-million plant at Pensacola, Fla., is an example of how large a packaged plant can be. From natural gas, it produces ammonia, nitric acid, prilled ammonium nitrate and ammonium nitrate solutions in one plant; methanol in another.

It is also a prime example of how packaged units enable a company to put a process plant complex onstream fast. Concurrent erection of the packaged ammonia, nitric acid and ammonium nitrate units permitted a relatively short building period—one year.

Escambia's methanol package was built in even less time. Design and engineering were supplied by Chemico. Estimates are that if the units were custom-designed and engineered, an additional year would have been needed between go-ahead and onstream.

Not all custom work is eliminated, however. In putting up a packaged installation in some new area, the plant supplier must adjust his packaged designs to meet local conditions of terrain, power supply, water supply, etc. These usually require additional engineering changes, without affecting the cost-saving benefits of the package.

Spelling Out More Advantages: Duplicate installation, one of the hallmarks of the packaged plant, permits supplier and plant customer both to benefit from the economies inherent in noncustom work. Much of the supplier's engineering is reduced to adaptations.

And the purchasing company's engineering and administrative staffs are free to work out the necessary details of whatever custom units remain. They can concentrate on details of plant performance, price and delivery; decisions on these all-important counts come more quickly with packaged units.

Short-Orders: Frequently, increased plant capacity is needed at a time when existing engineering personnel can ill afford to produce it. Where the plant is a custom-designed installation, these details alone could require a year or more to put into shape, not to mention the additional time needed to build the installation.

The packaged unit, on the other hand, requires comparatively little additional engineering time or personnel. Buying a "package" helps companies move quickly into a new market, or expand quickly to take advantage of a fast-growing market.

Proponents of packaged plants also say that maintenance, repair and overhaul is easier and usually cheaper with packaged-plant equipment. Since many units and components are standard, and often stocked by suppliers, equipment upkeep is simplified. Shutdown time is usually less for packaged equipment, not because the units require less maintenance, repair or overhaul than custom equipment, but because they lend themselves to quick turnover. Modular design and off-the-shelf features make this possible.

Equipment Savings: The equipment fabricator or supplier can generally deliver a packaged plant at less expense than he can a custom job because of quantity purchasing of materials and better shop know-how. Shop operations are repeated, are improved with each job. Prefabrication of equipment is not unusual.

Companies selling the packaged plants claim shop morale is generally better on a noncustom project; shop superintendents can train personnel faster. Additional engineering and drafting, if needed, proceeds at a quicker pace. Crating and shipping of equipment and storage become routine. Extensive supervision isn't required. Problems arising from delineating responsibility and jurisdiction are lessened.

Because virtually the same package is often used by companies in various industries (packaged spray-drying equipment, for example, is used for drying milk, blood, coffee, syndets, tanning agents, etc.), the new customer is provided with the cumulative experience gained by the equipment fabricator and supplier.

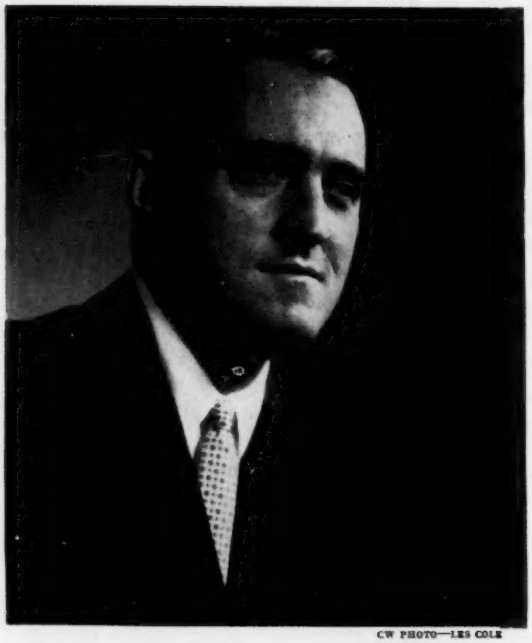
Custom Pluses of Packages: For the small to medium-size process company, packaged plants have special advantages. These processors are neither equipped to, nor can they afford to, research, develop, design and engineer their own new equipment and plant. That's especially true today, when units are heavily instrumented for automation, or made from special materials (e.g., alloys resistant to high-temperature, pressure and corrosion).

Nevertheless, such companies need equipment for expansion, modernization, process improvements, and to lower production cost, just as do large firms. Pack-

Yardsticks to Help Figure Plant Costs

Below are typical service charges (expressed as a percent of total construction costs) for design-engineering a custom process plant. The packaged-plant buyer can usually beat these costs 5-15%, depending on the size of the package unit. Use the lower estimates given below for simple plants, especially if repetitive elements are involved.

Total Plant Construction Cost	$400,000	$2.0 million	$5.0 million
Drafting	6.50-8.50%	4.50-5.75%	3.50-4.50%
Engineering	2.50-3.50%	2.25-3.25%	2.00-3.00%
Procurement	1.00-1.50%	0.75-1.25%	0.50-1.00%
Construction Supervision	>1.25%	0.75-1.25%	0.50-1.00%



CW PHOTO—LES COLE

Meet the Author

John J. Mahoney

Chemical Week's report author John Mahoney (B.Ch.E., '40—The City College of New York) is consultant to a number of chemical process industry firms. His specialties: chemical engineering plant design, equipment selection, cost control and packaged-plant equipment.

Mahoney's interest in packaged plants is prompted by the inordinate difficulty that, he says, small firms experience in trying to obtain modern equipment at reasonable costs, especially today, when design engineering costs are skyrocketing.

He was formerly chief engineer with Foster D. Snell, Inc., New York consulting firm, and was with Colgate-Palmolive Co. These, and his other associations, round out his 18 years of chemical engineering experience in the CPI.

aged plants and packaged designs often put such equipment within the reach of the smaller chemical producer.

Frequently, small to medium-size process firms run into trouble in getting enough capital for new plant construction. Ease-of-financing is one feature of the packaged units. Usually, venture capital is more easily obtained with packaged-plant equipment than with custom installations. Reason: equipment installed and operating smoothly is a better investment risk when it is duplicated at some new site than would be equipment in an untested one-design unit.

The smaller company, more limited in financing flexibility than larger firms, may also find interest in the leasing and commodity purchasing arrangements of some packaged plants. Besides the advantages mentioned, commodity purchasing has this feature: it's the lessor's worry, as well as the lessee's, to keep the commodity flowing. Plant breakdowns are quickly attended to by the plant supplier. If the breakdown is a major one, a new modular component may be quickly substituted for the old one.

Drawbacks, Too: There are inherent shortcomings in packaged-plant concept, besides inherent benefits.

A major disadvantage, of course, is that not every new plant project bill can be filled by a package. Although many more packaged plants are available today than ever before, it's unlikely there will ever be a packaged unit that will meet every need.

Three or four similar packages working in parallel might meet the need, but it would probably be less attractive than, say, one custom unit. The process company's engineering staff must resolve the question by figuring comparative operating and capital costs per unit of output by both routes, and choose the most economic one.

A packaged offering may not fit the physical layout of the processor's existing facilities. Platform levels, for example, may not coincide. The purchase of the packaged unit would require major overhauling of the main plant. Similarly, it's possible that the package may not conform to the existing design standards in a plant, may make tooling and stocking of parts unwieldy. Example: a packaged distillation column may have internal features completely different from those in a still already operating at the plant.

Packaged-plant equipment does not have the intrinsic process flexibility that custom-designed plant equipment has. When the purchaser chooses a package, he's more or less bound by its limitations, can't revamp the plant or equipment to suit his changing needs. Firms that introduce new products every year demand maximum flexibility of process and equipment. Packaged units, in such cases, may stunt production improvements. That's a problem for research, development, design and engineering staffs to resolve before deciding for or against the package. There's one other disadvantage. Packaged plants can never give the purchaser the technological lead over established competitors who are using the same equipment in the same market and area. Only custom-designed plants and equipment that evolve from heavy research and development efforts can give this competitive edge.

Chemical Week Directory—Packaged Plants and Suppliers

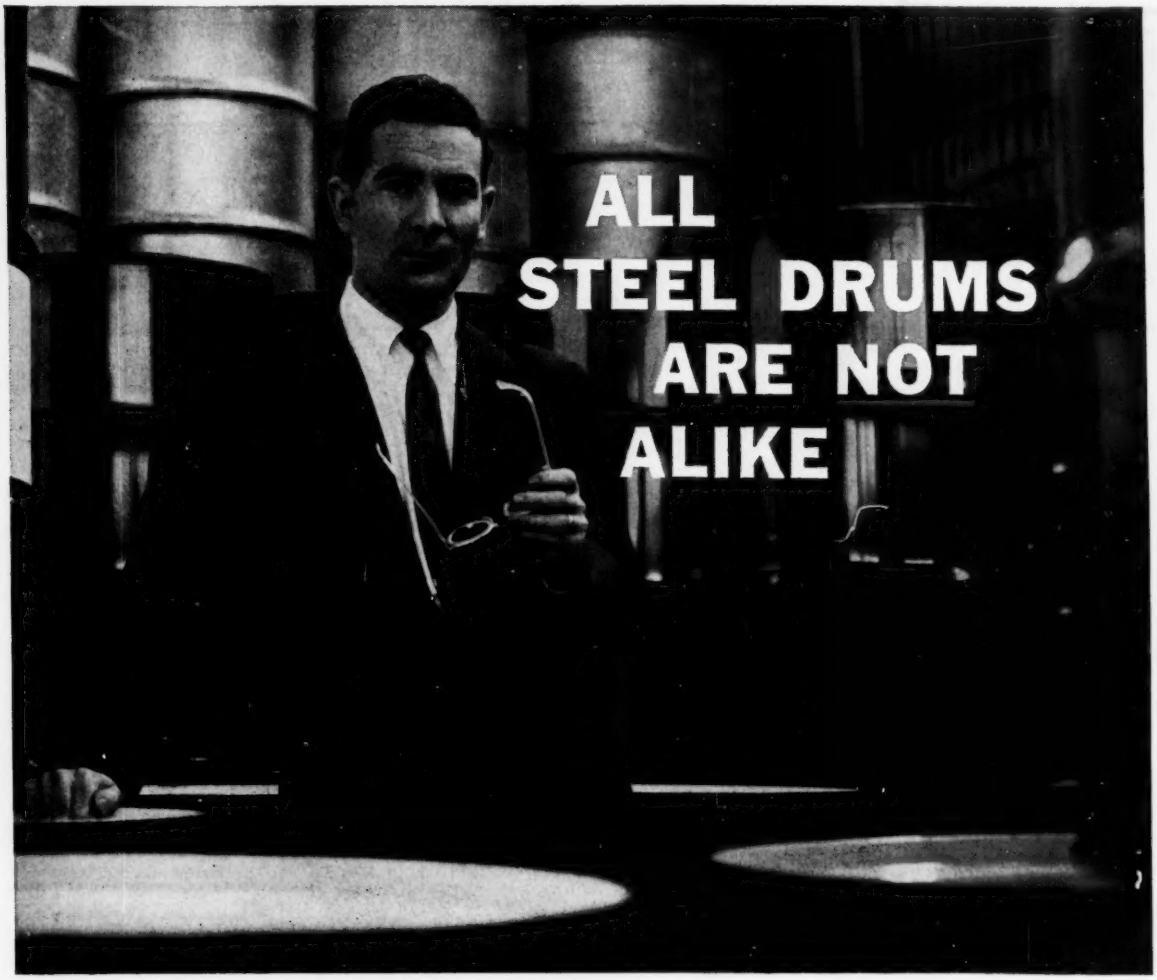
AIR PRODUCTS, INC.
P.O. Box 538
Allentown, Pa.

Package Plants Available	Main Products	Number of Installations	Capacity	Plant Prices Per Output Unit	Remarks
R-300 (see remarks)	Oxygen	6	215,000 cf./month	Total cost of oxygen or nitrogen product from these units ranges from 50¢/100 cu.ft. with the R-300 model to 5¢/100 cu.ft. with the T-75 model. Expressed in tons of oxygen or nitrogen product, the cost range is from $120/-ton to $12/ton.	Numerical equipment designations express the productive capacity of the generator in cu.ft./-hour (in the case of Models T-75 and T-58, the numerical designations express productive capacity in terms of tons/day).
R-700	Oxygen	43	500,000 cf./month		
R-900	Oxygen	10	650,000 cf./month		
R-1100	Oxygen	24	780,000 cf./month		
RD-1500	Oxygen	17	1.04 million cf./month		
RDON-1500	Oxygen, Nitrogen	2	860,000 cf./month (O_2) 860,000 cf./month (N_2)		
RD-1750	Oxygen	8	1.25 million cf./month		
RD-2100	Oxygen	23	1.50 million cf./month	Exact product cost depends on the customer's power and water cost, and other variable items.	
RD-2500	Oxygen	18	1.80 million cf./month		
RDON-2500	Oxygen, Nitrogen	6	1.44 million cf./month (O_2) 1.44 million cf./month (N_2)		
EON-3500	Oxygen, Nitrogen	18	2.00 million cf./month (O_2) 2.00 million cf./month (N_2)	The above figures represent the total cost of gaseous or liquid products based on equipment rentals or an "over the fence" sale of these products. Gas produced by larger semipackaged units is available at as low as $12/ton.	
E-7000	Oxygen	29	5.00 million cf./month		
EON-7000	Oxygen, Nitrogen	13	4.30 million cf./month (O_2) 1.80 million cf./month (N_2)		
E-12,000	Oxygen	5	8.60 million cf./month		
EON-12,000	Oxygen, Nitrogen	6	6.50 million cf./month (O_2) 3.60 million cf./month (N_2)		
T-75	Oxygen, Nitrogen	—	54.0 million cf./month (O_2) 5.25 million cf./month (N_2)		
E-25,000	Oxygen	12	18.0 million cf./month		
T-58	Oxygen	2	42.0 million cf./month		

AMERICAN AIR LIQUIDE, INC.
405 Lexington Ave.
New York 17, N. Y.

Air separation	Oxygen, Nitrogen, Argon	1952–57: 21	5-350 tons/-day (O_2)	On request	For chemical and metallurgical industries.
Carbon monoxide separation of reforming or chemical off-gas	Carbon monoxide, Hydrogen	1952–57: 2	24–100,000 cf./day CO 120–132,000 cf./day H_2	On request	From reforming gas or chemical off-gas.
Carbon monoxide separation of reforming or chemical off-gas	Carbon monoxide, Hydrogen	1952–57: 2 1947–52: 1	123–374,000 cf./day CO 235–453,000 cf./day H_2	On request	From reforming gas or chemical off-gas.
Methane purification	Pure methane	1952–57: 2	288–550,000 cf./day H_2	On request	From natural gas.

Package Plants Available	Main Products	Number of Installation	Capacity	Plant Prices Per Output Unit	Remarks
ARTISAN METAL PRODUCTS **73 Pond St.** **Waltham 54, Mass.**					
Methanol solvent recovery	Methanol	1957: 3	10-gal./hour minimum	$300–$400/gal.	———
Monomer distillation	Uninhibited acrylic monomers	1956: 4 1957: 6	50–1,500 lbs./hour	$15–$30/lb./hour	———
Glycol concentrator	Glycol	1956: 4 1957: 2	25–1,000 lbs./hour	$1,200–$10,000/unit	———
Evaporator stripper	Medium viscosity, heat - sensitive material	1956: 5 1957: 5	25-gal./hour minimum	Varies	———
Thin film centrifugal processing	High viscosity, heat - sensitive material	1956: 5 1957:15	40-lbs./hour minimum	Varies	———
Steam pre-expander	Pre-expanded polyethylene	1957: 1	300–500 lbs./hour	$3,400/unit	Requires use-license.
Reactor and associated auxiliaries	Plastics, synthetic coatings, adhesives, etc.	1956: 1	5-gal. batch	Varies	High vacuum and pressure.
Reactor and associated auxiliaries	Plastics, synthetic coatings, adhesives, etc.	1957: 1	25-gal. batch	Varies	High - temperature, liquid-phase heating system.
CHEMICAL CONSTRUCTION CORP. **525 West 43 St.,** **New York, N. Y.**					
Contact sulfuric acid	Sulfuric acid	about 200	approx. 10-800 tons/day	$3,000-$6,000/ton/day	All ranges of unit prices given in Chemico's listing do not include unusually small units.
Gas reform furnace	Hydrogen, carbon monoxide	60.	50,000–10 million cf./-day	20¢-40¢/cf./day	—
Nitric acid	Nitric acid	35	5–300 tons/-day	$6,000–$12,000/ton/day	—
Gas scrubbers	—	250	300–300,000 cf./minute	50¢–$2.00/cf./minute	—
N. E. C. process ammonia	Ammonia	60	5–500 tons/-day	$25,000–$50,000/ton/day	—
BASF acetylene	Acetylene	4	24–96 tons/-day	$85,000–$142,000/ton/-day	Number of installations includes expansions.
Urea	Urea prills	8	30–200 tons/-day	Approx. $20,000/ton/-day for once-through; approx. $25,000/ton/-day for complete recycle	Number of installations includes expansions.
CHEMITHON CORP. **4001 Leary Way** **Seattle 7, Wash.**					
Sulfonation unit	Detergent bases, like sulfonated dodecyl benzene and sulfated fatty alcohols.	1957-58: 7	Ranges from 2.5 million to 30 million lbs. of active ingredient/-250 operating days.	$30,000/million lbs./year for the 1-million-lbs. size $13,000/million lbs./year for the 5-million-lbs. size $6,500/million lbs./year for the 20-million-lbs. size	Plants are continuous, heavily instrumented, need little operator attention. Unit occupies 20 x 20 ft. Completely prefabricated and easy to assemble. Designs exist for an 0.5-million-lbs. unit and a 40-million-lbs. unit.



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United States Steel Products Division

USS TRADEMARK

Package Plants Available	Main Products	Number of Installations	Capacity	Plant Prices Per Output Unit	Remarks
ENGELHARD INDUSTRIES INC. **Newark, N. J.**					
Nitroneal generators for production of nitrogen with a controllable hydrogen content	Oxygen - free gas consisting of nitrogen, hydrogen, and water vapor with a controlled hydrogen content	143	50–100 cf./-hour 125–500 cf./-hour 375–1,500 cf./hour 750–3,000 cf./hour 1,500–6,000 cf./hour 2,500–10,000 cf./hour	Units range in price from $2,375–$28,700	By changing the air-ammonia ratio, the hydrogen percentage may be varied and maintained at any desired point within the range of the generator.
GIRDLER CORP., **Louisville, Ky.**					
Carbon dioxide producer	Carbon dioxide	1943-58: 50	0.6–5 tons/-day	$20,000 to $45,000/ton/-day	Gas, liquid and solid products. Gas, fuel or oil feed. N_2 by-product.
Hydrogen producer	Hydrogen	1943-58: 30	24,000 to 96,000 cf./-day	$300 to $4,000/thousand cf./day	Various purities of H_2 available. Natural gas, LPG, oil and methanol feed.
Hydrogen sulfide producer	Hydrogen sulfide	1955-58: 3	1 to 5 tons/-day	$24,000 to $80,000/ton/-day	Sulfur and hydrogen process feed.
Girbotol-hydrogen sulfide and carbon dioxide removal	Purified gas or liquid stream	1932-58: 15	0.2 to 8 tons/day	$8,000 and up/ton/day	—
Hydrogen chloride (anhydrous)	Hydrogen chloride	1958: 1	6 tons/day	$18,000 ton/day	—
MAURICE A. KNIGHT CO., **P. O. Box 111,** **Akron, Ohio**					
Muriatic acid	Water-white hydrochloric acid	1942-57: 50	5–130 tons/-day	$2,000/ton/day	Gas streams of low HCl content (10%) can be utilized.
Anhydrous HCl	99.5% HCl; 90 ppm. H_2O maximum	1951-57: 7	3–20 tons/-day	$8,000/ton/day	Completely instrumented plant.
Chrome plating solution recovery	45–50 oz. CrO_3/-gal.	1951-57: 7	40–195 gph. water evaporation	$200/gph.	Purification by deionization optional.
LUMMUS CO., **385 Madison Ave.** **New York 17, N. Y.**					
Portable refinery	Caustic-washed straight - run gasoline; kerosene; diesel oil; fuel oil	1952-57: 1	1,000–2,000 bbls./-stream day	Selling price: approximately $220,000 exclusive of equipment tankage and ethyl blending facilities.	—

Package Plants Available	Main Products	Number of Installations	Capacity	Plant Prices Per Output Unit	Remarks
PATTERSON-KELLEY CO., INC., **E. Stroudsburg, Pa.**					
611	Experimental	1952-57: 20	5 gal./batch	Initial cost: $4,000	—
612	Experimental	1952-57: 9	10 gal./batch	Initial cost: $2,770	Pilot reactor.
612	Experimental	1952-57: 5	5 gal./batch	Initial cost: $2,570	Pilot reactor.
613	Experimental	1952-57: 7	15 gal./batch	Initial cost: $10–$20,000	—
613	Experimental	1952-57: 3	25 gal./batch	Initial cost: $10–$20,000	—
613	Experimental	1952-57: 2	60 gal./batch	Initial cost: $10–$20,000	—
616	Experimental	1952-57: 1	15 gal./batch	Initial cost: $7,400	Installation available.
Vacuum dryer	Experimental	1952-57: 3	—	On application	Pretest service available.
PFAUDLER CO. DIVISION, PFAUDLER PERMUTIT, INC., **1000 West Ave.,** **Rochester 3, N. Y.**					
Pilot plant	Miscellaneous chemicals, resins, plasticizers	1951–57: 35	5–500 gal.	———	Reaction; distillation; polymerization; mixing.
Reconcentration plants; recovery plants; evaporation plants	Plating solutions (chromium, nickel zinc, copper, brass and gold salts)	1951–57: 31	600–8,600 gal./day	$8 – $24/gal./day, uninstalled cost	Semicontinuous vacuum evaporation.
Polymerization plants	PVC; polyethylene; polyesters	1954–57: 9	Pilot size to 35,000 lbs./day	$35/lb./day, uninstalled cost of production size plant	Suspension process.
Esterification plants	DOP, DIOP, DIOA, etc.	1950–57: 4	6,000 to 22,000 lbs/day	$6–7/lb./day, uninstalled cost	———
Wiped - film evaporator	Purified esters	1957: 2	40–1,000 lbs./hour	———	High-vacuum evaporation.
SEMET-SOLVAY ENGINEERING DIVISION, ALLIED CHEMICAL & DYE CORP. **40 Rector Street** **New York 6, N. Y.**					
High-Btu. oil gas production plant	High-Btu. oil gas; tar and crude light oil by-products (unsaturates)	1952–57: 4 1958: 1 under construction	1–15 million cu. ft.	Approx. $450–$750/million cf./day of gas prod. capacity	Main engineering and design of equipment and plants for different capacities than given here has been completed. Equipment is standardized. Practically all equipment must be fabricated in company's shop after receipt of order. Process is covered by domestic and foreign patents.
Ammonia recovery plants; producer gas plants; blue gas plants; carbureted water - gas plants; carbon monoxide generating plants; heavy-oil handling systems for oil-gas production plants; light-oil recovery plants	———	———	———	———	Supplier indicates that all of this equipment is standardized, varying in size only.

Package Plants Available	Main Products	Number of Installations	Capacity	Plant Prices Per Output Unit	Remarks
SCIENTIFIC DESIGN CO., INC. **2 Park Ave.** **New York 16, N. Y.**					
PVC resins manufacturing plant	PVC resins	1954–58: 6	4–25 million lbs./year	7–8¢/lb. for larger plants	———
FOSTER D. SNELL, INC. **29 West 15th St.,** **New York 11, N. Y.**					
Syndets	Detergents	1952–57: 2	Four sizes from 5 to 25 tons/day	From $23,000 to $8,800/ton/day	Includes sulfonation product "building" and spray drying.
STANDARD STEEL CORP. **P.O. Box 58252** **Los Angeles 58, Calif.**					
Fish meal and oil reduction	High protein fish meal and oil	1950–57: 24	3–20 tons of raw material/hour/line	Total price: $60–$200,000	———
TITLESTAD CORP. **521 Fifth Ave.,** **New York 17, N. Y.**					
Sulfuric acid and oleum (contact-process)	60° Bé, 66° Bé and 98% acids; 20%, 40% and 65% oleums	Over 10 since 1945	5 tons/day to 700 tons/day	$25,000–$3,000/ton/day	Costs are for sulfur-burning plants. Includes platinum catalyst.
Ammonia oxidation	NO, NO_2 and nitric acid	Over 15 since 1945	5 lbs./hour NH_3 to 125 lbs/hour NH_3	$1,000/lb. NH_3/hour to $400/lb. NH_3/hour	Includes platinum catalyst.
Nitric acid	Nitric acid	Several since 1949	1 ton/day to 80 tons/day	$100,000/ton/day to $12,500/ton/day	Includes platinum catalyst.
Sulfuric acid	50/60° Bé sulfuric acid	Several since 1950	5 tons/day to 50 tons/day	$25,000 to $9,000/ton/day	Costs are for sulfur-burning plants.
Hydrogen sulfide conversion	Molten elemental sulfur	1957:1	3–12½ long tons/day	On request	Unit is skid-mounted. Plant may be used for recovering sulfur from waste H_2S gas, or for air pollution abatement.

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Niagara stainless steel pressure leaf filters: #510-28, 500 sq. ft.; #36H-110-3, 100 sq. ft. horiz.; #80-30, 76.8 sq. ft., jacketed; #45-30, 45 sq. ft. Perry, 1415 N. 6th St., Phila., Pa.

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Chicago 11 ..... Alfred D. Becker, Jr., R. J. Claussen, 520 N. Michigan Ave., MOhawk 4-5800

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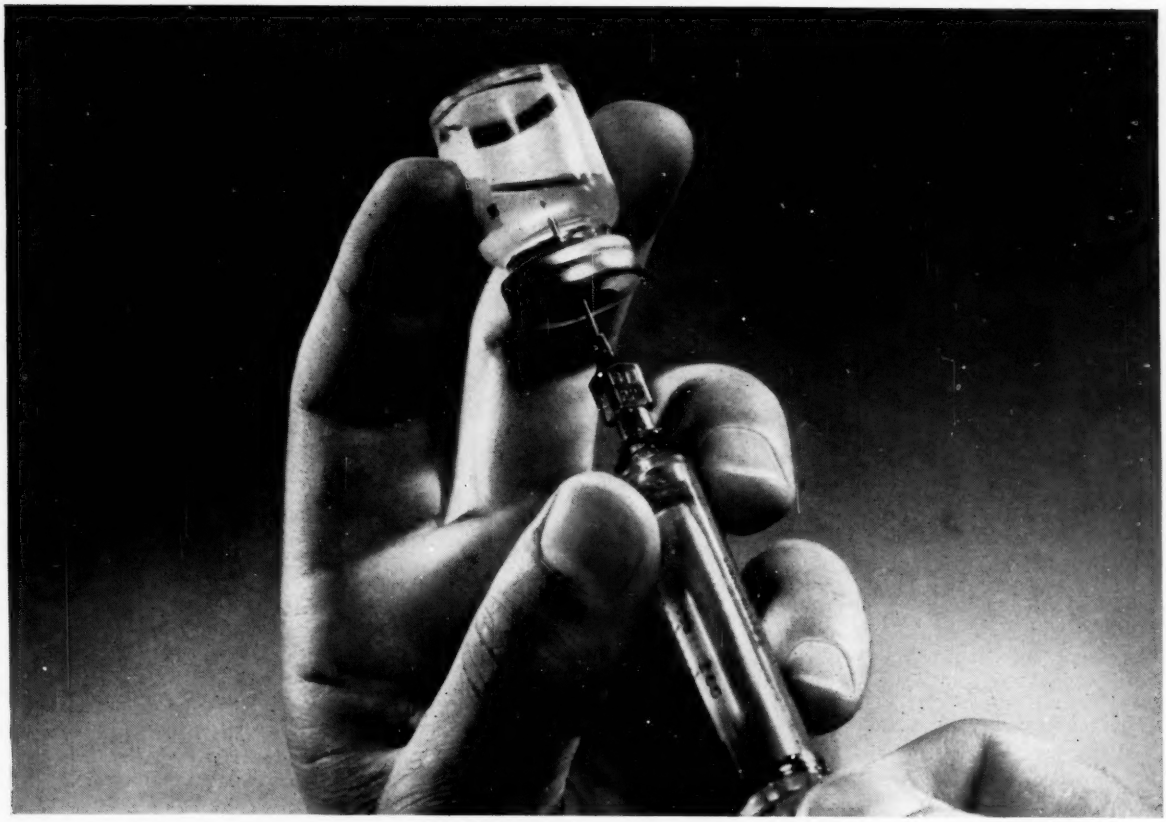

Why Chas Pfizer & Co., Inc., chose

B&A® Magnesium Chloride for use in 2 antibiotics

As one of the world's leading producers of antibiotics, Chas. Pfizer & Co., Inc., is constantly striving to further the progress of medicine with new and better drugs. Here is how Baker & Adamson, America's leading producer of high purity laboratory and process chemicals, helped Pfizer solve one fine chemical problem.

A Problem In Purity

Pfizer needed an ultra-pure, pyrogen-free magnesium chloride as a buffering - stabilizing agent in the production of intramuscular dosage forms of two broad spectrum antibiotics — Terramycin* and Tetracyn*. When dissolved in water, it had to give a completely clear solution and be free of insolubles and other undesirable impurities.

Here are the rigid specifications developed by B&A to meet Pfizer's special requirements:

Magnesium Chloride

Appearance	White Powder
Solution Turbidity	1:5 (by weight) solution must be clear when rated as a parenteral solution.
Pyrogens	Must be Pyrogen-Free
Moisture by Karl Fisher Reagent	45% Max.
Nitrate (NO_3)	less than 0.002%
Sulfate (SO_4)	less than 0.004%
Alkali Salts (as NaCl or KCl)	to pass test (limit about 0.10%)
Barium (Ba)	to pass test (limit about 0.005%)
Calcium (Ca)	to pass test (limit about 0.01%)
Heavy Metals (as Pb)	less than 0.0025%
Iron (Fe)	less than .005%

Additional control checks to insure rigid quality are made on the following: Phosphates, Arsenic, Fluorine, Manganese, Sulfides, Ammonium and Zirconium.

While Pfizer chemists invited a number of chemical specialty manufacturers to develop this ultra-pure magnesium chloride—*only Baker & Adamson produced the high purity, high quality chemical Chas. Pfizer & Co., Inc., needed!*

This is just one example out of many, demonstrating how Baker & Adamson is constantly working with pharmaceutical houses and other manufacturers in many fields to supply fine and special chemicals of the highest purity, meeting rigid specifications. Whenever *your* problem calls for a fine chemical . . . call B&A!

*Reg. Trademark of Chas. Pfizer & Co., Inc.

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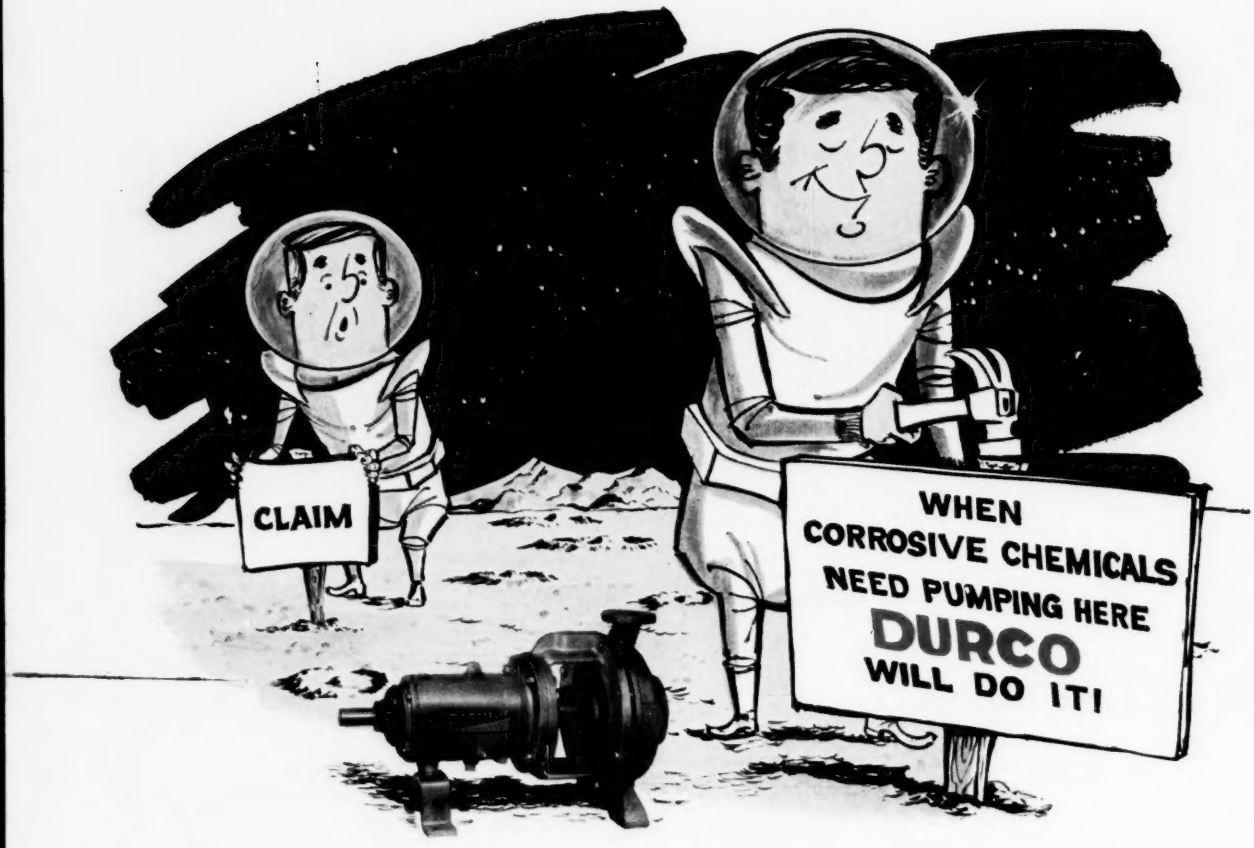
Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.



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Make your own job easier. Get the right pump in the right alloy to do the job as it should be done. Durco service engineers can help you put in the pump that will give you continuous service, with minimum maintenance, at lowest operating costs.

Durcopumps are available with heads to 345′ and capacities from ½ to 3000 gpm in fourteen standard corrosion resisting alloys.

Durco service engineers are available almost everywhere.

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